User Manual
&
Spare parts catalogue
for the TP 160 wood chipper in the park series

Linddana A/S • Ølholm Bygade 70 • DK-7160 Tørring • Tel. +45 7580 5200 • tp@linddana.dk • www.tp.dk

LINDDANA

1 Introduction

Congratulations on your new TP wood chipper.

Linddana produces TP wood chippers of the finest quality by using the most modern production technologies, i.a. laser cutting, CNC technology and robot technology in bright and open production facilities.

For safety reasons and in order to get maximum pleasure from the wood cutter, it is important to read these instructions before use.

The user manual explains about safety, use and maintenance so that the work with the wood chipper will be safe and profitable.

This manual has been translated from Danish.

Linddana A/S

Jørgen Due Jensen, Managing director

Your distributor is always available with spare parts, advice and guidance.

Distributor stamp

2 EU declaration of conformity.

Manufacturer:

LINDDANA A/S, Ølholm Bygade 70, Ølholm, 7160 Tørring, Denmark
hereby declares that

Wood chipper:

is in concordance with the provisions of the Machine Directive (Directive 06/42/EC) and with the national legislation which translates this directive;

is in concordance with the following other EC Directives:
2000/14/EC

Furthermore it is stated that
EN 13525 (harmonised standard), has been used.

Title: Managing director
Name: Jørgen Due Jensen

Ølholm, 14 September 2010

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4 Use

The TP 160 wood chipper is designed for **stationary** wood chipping in the form of braches etc.

The machine must **not** be used for materials containing stone, metal or other foreign bodies. These foreign bodies can in the best case dull the knives and in the worst case break the machine. Knives and anvil can break when stone or metal comes in between them.

The machine must **not** be used for wood chipping of wood containing nails, screws, arming etc.

When feeding branches you must stand next to the feeding hopper (see fig. 1).
The branches can be thrown around when the retract rollers get a hold of them.
Logs must be fed into the machine from the back (see fig. 2).

Figure 1 Feeding branches

Figure 2 Feeding logs

Remember to keep the **knives** and **anvil** sharp, it makes feeding easier and gives a better quality chips, and besides it lovers the use of fuel considerably.

The machine must be inspected daily, meaning the rotor housing must be opened and the rotor, knives, anvil etc. must be inspected. By doing this you prevent unexpected stops and prolong the life of the machine.

The tractor or trailer upon which the machine is mounted must always have the brakes activated during work.

The machine must **not:**

- Be used for other materials than wood
- Be used to push trees, stubs etc.

There must **not** be equipment like forest chains, axes, chain saws etc. in the feeding hopper.

5 Mounting instructions

5.1 Before use

The machine is equipped with a lifting point which is to be used when lifting the machine with a crane or any other hoisting device (ground assistance) (see Figure 3). The machine can also be lifted with a fork lift truck. This is done by using the holes made for this purpose on both sides of the foot (see Figure 4). Make sure that the forks of the truck are put all the way through otherwise the machine can tip over. The TP 160 MOBILE is mainly transported on the trailer wheels, but it can also be lifted with a fork lift truck (see Figure 5). The TRACK model can be lifted with a forklift truck on a pallet. (see Figur 6)

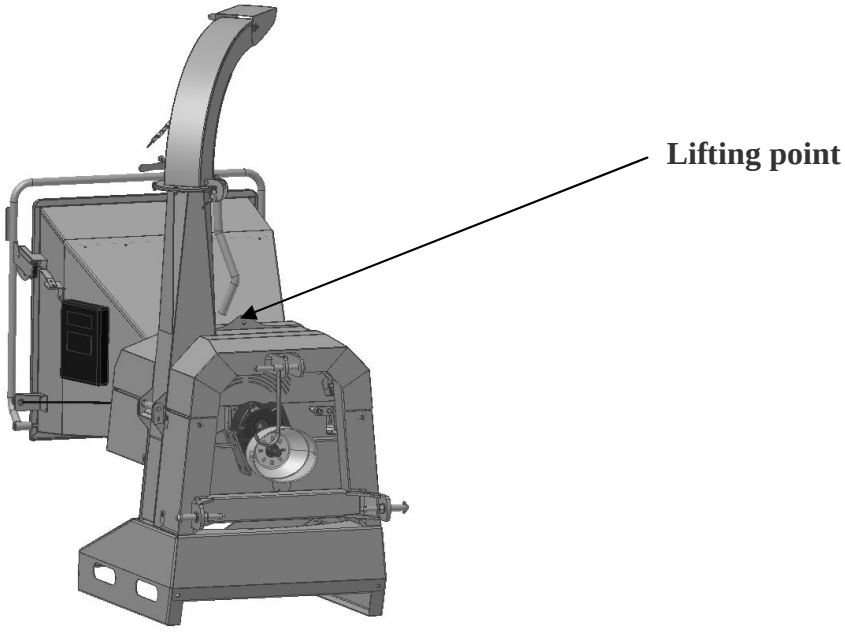


Figure 3 Lifting point on the machine

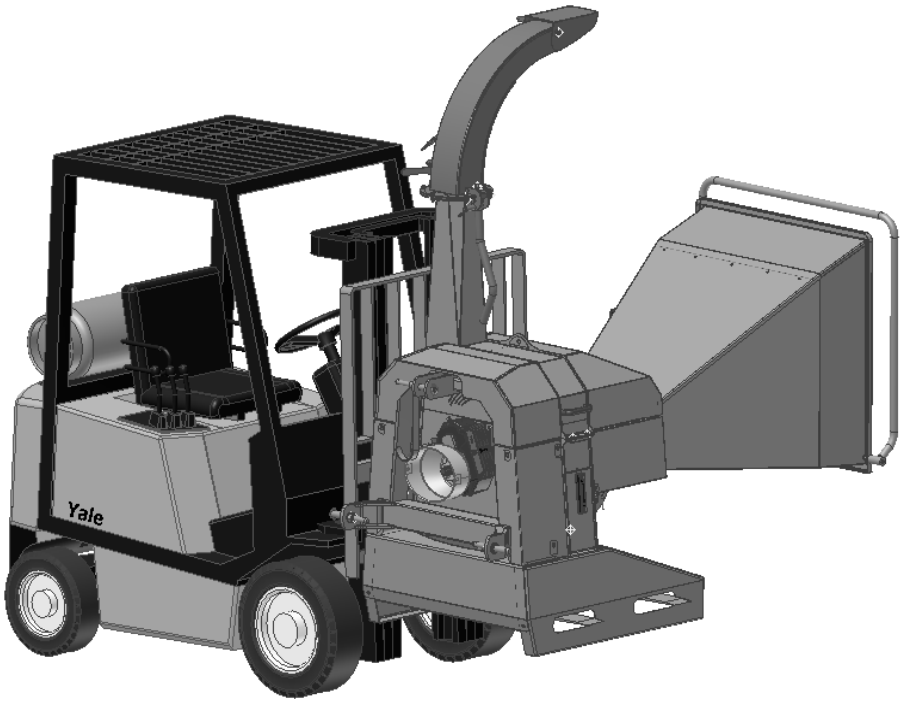


Figure 4 Lifting with a fork lift truck

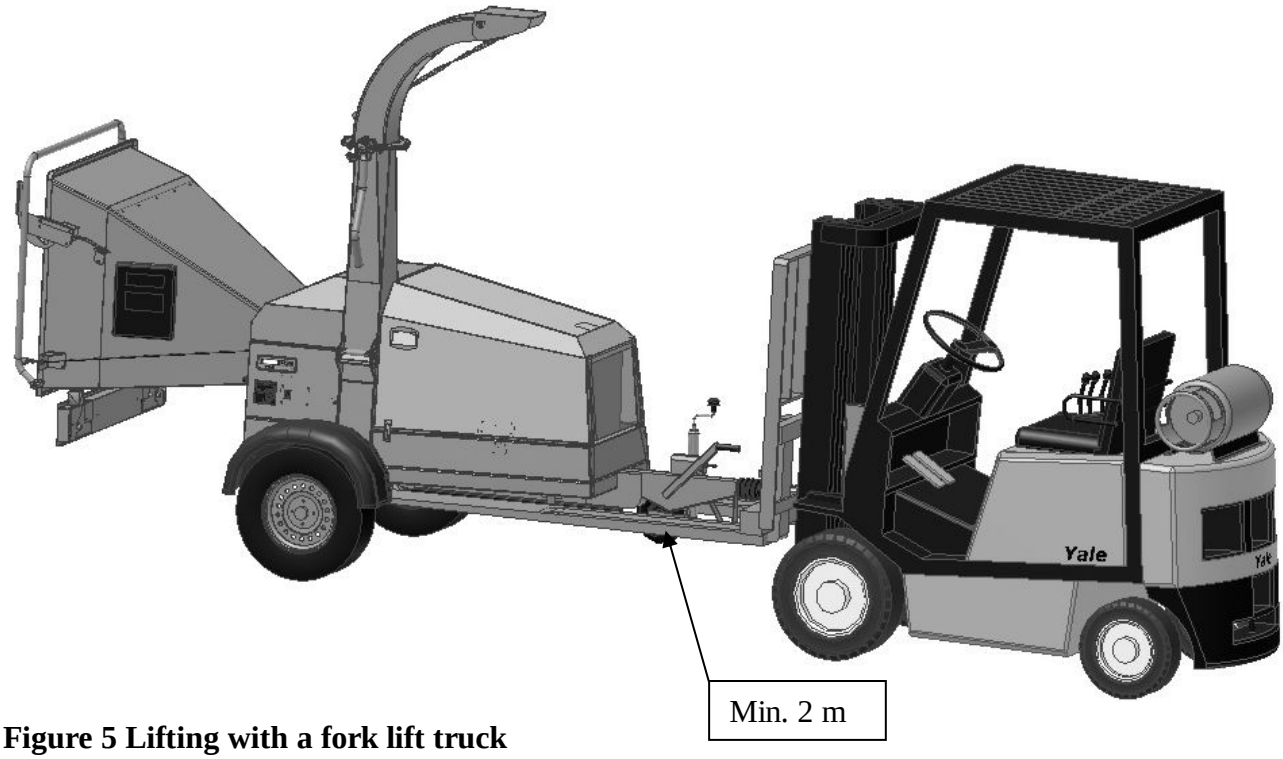
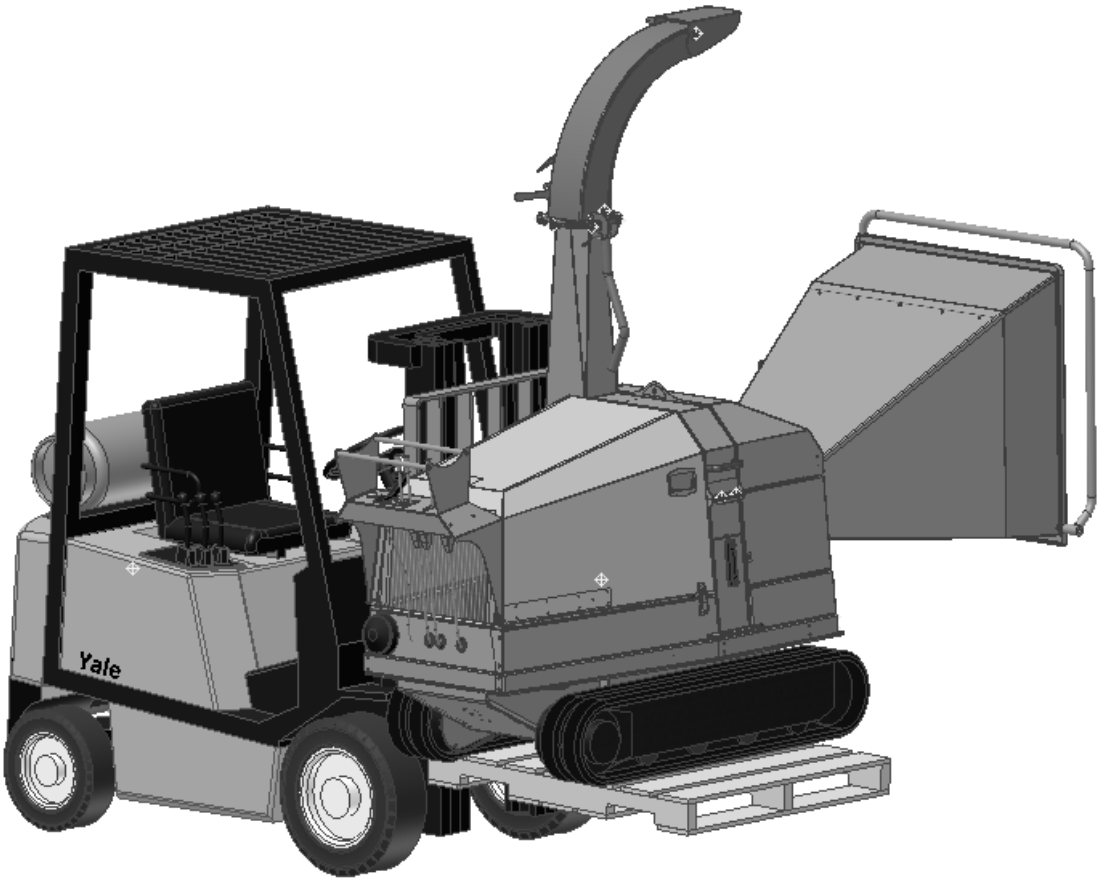


Figure 5 Lifting with a fork lift truck



Figur 6 Lifting with a fork lift

Store the manuals for the PTO member with this manual in the manual box on the machine.

Before operation you must check that the wood chipper cleared of foreign bodies. The machine **must** be uncoupled from the tractor's PTO, for the MOBILE and TRACK models, the key **must** be removed from the ignition before opening for the rotor. Check that the rotor is at a complete standstill. Turn the ejector tube so that it faces the opposite direction of the rotor housing (see fig. 7). Loosen the bolts that hold the upper and lower rotor housing together. Lift the top part of the rotor housing up until the ejector tube rests on its own. Turn the rotor a few times by hand. Remove any foreign bodies.

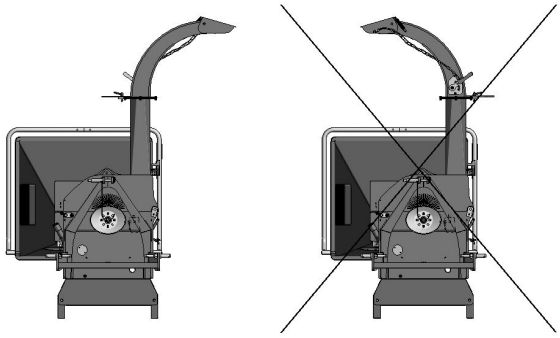


Figure 7

Position of ejector tube when opening rotor housing

Check that the gap between the knives and the anvil is correct = **0,5 – 0,9 mm**. The knives have a fixed **knife position** = **10 mm.** Check that the knives are not rubbing on the anvils.

Lift the top part of the rotor housing back in place and tighten the bolts.

Check that all bolts, nuts and screws are tightened properly.

Remember to lubricate all the lubrication points (see maintenance schedule, page 16).

Old hydraulics and motor oil and used oil filters and air filters must be handed in at an approved receiving station.

5.2 Mounting instruction

The machine is designed to be mounted on the tractor's three-point-suspension or trailer mounted with its own engine.

Machines for mounting on the tractor's three-point-suspension is delivered with a PTO axle with either 1 3/8" - 6 splines or 1 3/8" - 21 splines.
At certain types of tractors a PTO axle with 1 3/8" - 21 splines is used.

The PTO axle **must** be mounted with free running on the machine side.
Linddana uses Walterscheid W400 with free running which comes with the machine.

The length of the PTO axle has to be adapted to the tractor following instructions from the supplier of the PTO axle. See the attached manual for the PTO axle.

The machine must stand on a plane, horizontal surface during use and the tractor mounted machines must be attached to the tractor's three-point-suspension (see Figure 8). The tractor's brakes must be properly activated. Trailer mounted machines must also have their brakes activated (see Figure 9).

When starting the machine: Attachment must be done with the motor running at idle speed or at as few revolutions as possible in order to avoid overloading of the PTO axle, gear box, tractor and wood chipper.

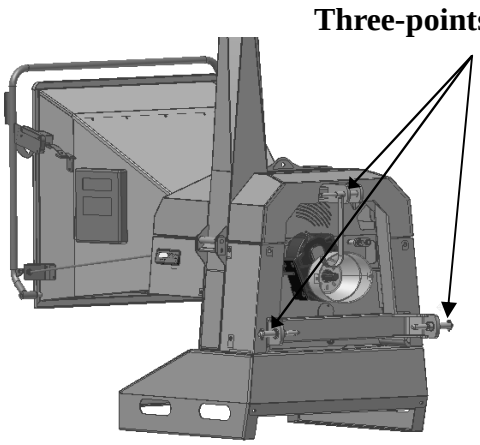


Figure 8 TP 160 PTO three-point-suspension

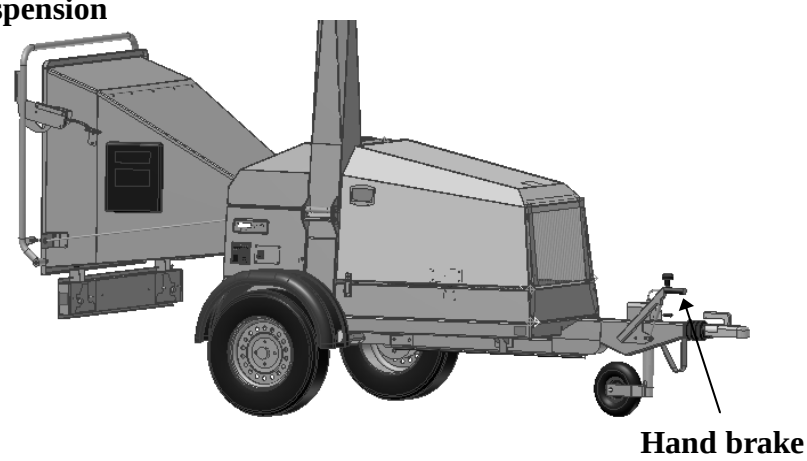


Figure 9 TP 160 MOBILE hand brake

6 Safety instructions

6.1 Safety regulations

- Use hearing protectors, safety goggles or a similar eye protection, close fitting safety clothing and safety shoes.
- When working near roads it can be prudent to wear a west which reflects the light to be more visible to the other road-users. The displaying of signs must be in accordance with the Road Traffic Act.
- Minimum age for users of the machine is 18, for training and under surveillance from an adult the age is 16.
- During operation, all body parts must be kept away from the feeding hopper and any moveable parts of the machine.
- Any material that is stuck between the retract rollers must **not** be attempted removed by hand before the spring has been demounted and the roller part opened.
- Always stand next to the feeding hopper during feeding of the machine. Always observe the terrain conditions around the machine. It can be dangerous to fall near the machine!
- Before starting the machine check that the safety devices are working properly. Especially the stop and return functions on the operation bow.
- The machine **must** not be started without the ejector tube mounted to the machine.
- **Never** use the machine in closed or poorly ventilated spaces, because of the danger of carbon monoxide poisoning.
- The top part of the machine as well as all other shielding must **not** be opened/removed before the rotor disc is completely immovable and the tractor's motor is stopped.
- **Always** stop the machine and the tractor during inspections, service or repairs. The machine **must** be uncoupled from the tractor's PTO.
- Tractor mounted machines have to be on the ground before service or repairs are done.
- Always remove the keys from the machine and/or the tractor before leaving it.
- After maintenance and repairs, the machine must not be started before all bolts are tightened and all safety devices are mounted.
- Three-point mounted machines **must** be coupled to the tractor's three-point- suspension before use.
- The maximum rpm for the machine (1000 rpm) must **not** be superseded.
- The transmission axle's tube shielding and covering must always be intact. Safety chains on the transmission axle have to be properly mounted.
- The length of the PTO axle has to be adapted to the tractor according to the recommendations from the supplier of the PTO axle.
- The ejector tube must **not** point towards people or areas where there are people. There is a safety distance of 20 m. in the direction where the chips are thrown.

- **<u>AT DANGER:</u> PUT THE OPERATION BOW IN NEUTRAL (See Figure 11)**

During operation the machine's height may not supersede 600 mm over the terrain (see fig. 10).
If this height is not maintained the operation/safety handle will not work as it should, and that may lead to risks of severe personal injury due to retraction.

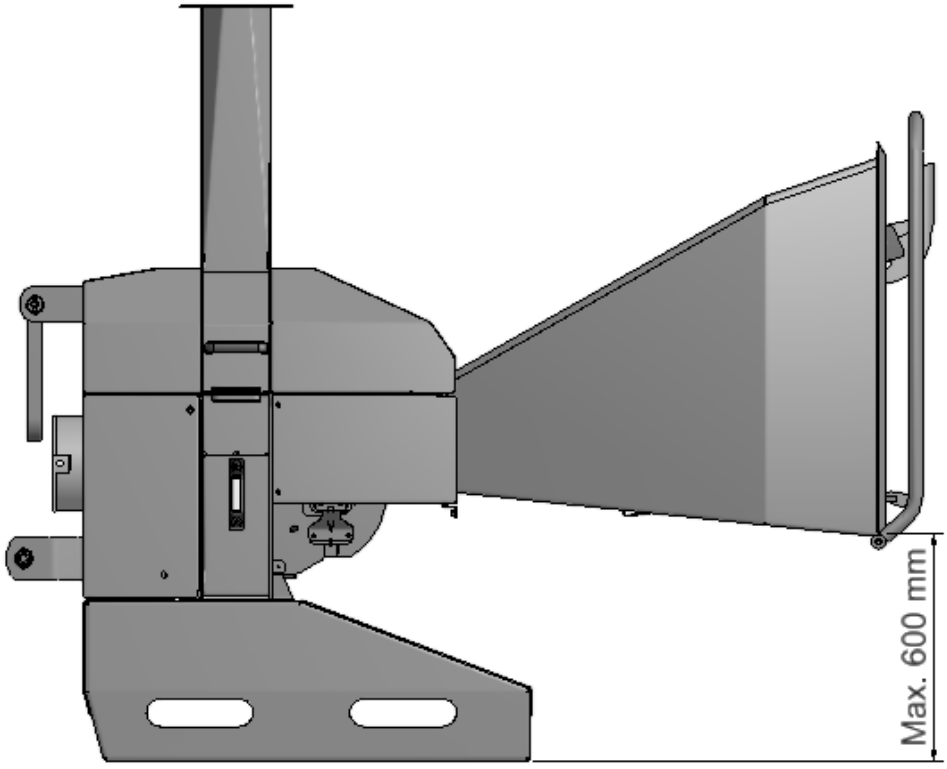
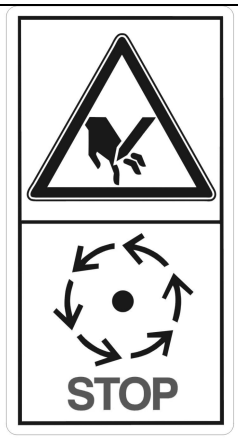
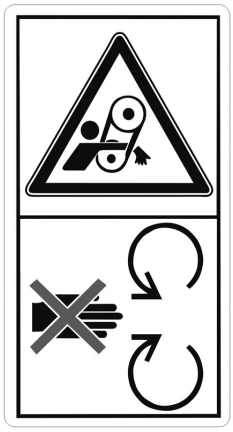
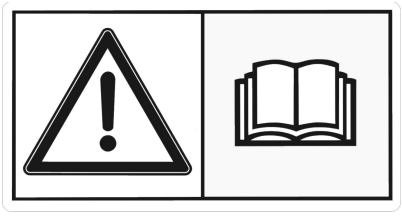


Figure 10 Maximum height over the terrain

- During transport or when the machine is dismantled, the PTO axle has to be placed in the machine's carrier bow.
- In case of transport on roads the ejector tube is turned so it is placed appropriately within the width of the machine and then it is fixed securely.
- During transport on public roads, the provisions of the authorities must be respected.
- During cleaning of the hopper, **THE RETRACT ROLLERS MUST BE STOPPED.**
- For cleaning a broom or similar **must** be used. Never touch the inside of the hopper when the machine is running.

6.2 Pictograms used

		
Warning: Objects thrown! Safety distance 20m!	Warning: Rotating knives! Wait for rotor to stop!	*Warning: Rotating rollers!*
		
Warning: Rotating belts!	Warning: Danger of retraction! Do not touch the hopper!	*Warning: Danger of retraction!* *Do not step on the hopper!*
		
Read the manual before use!	*Hearing protector and eye protection prescribed!*	*Lifting point for crane!*

6.3 Noise level

The sound effect level and the sound pressure level from the TP 160 PTO have been measured during use at 1000 rpm on the rotor disc, powered by a tractor.

The sound effect level and the sound pressure level from the TP 160 MOBILE have been measured during use at 1000 rpm on the rotor disc, powered by the Lombardini LDW 1404 engine.

The measurements have been conducted according to test provisions
Directive 2000/14/EC, 3. July 2000
EN ISO 3744, 1995
ISO 11201, 1995
ISO 4871, 19. March 1997
EN 13525, 17. February 2005

The guaranteed sound effect level which will be given by the manufacturer according to directive 2000/14/EC are as follows:

TP 160 PTO: **125 dB (A) re.1pW.**

TP 160 MOBILE, Lombardini: **123 dB (A) re.1pW.**

TP 160 TRACK, Lombardini: **123 dB (A) re.1pW.**
The machine's sound pressure level at the operator's seat is measured according to ISO 11201 at:

TP 160 PTO: **108 dB (A)**

TP 160 MOBILE, Lombardini: **102 dB (A)**

TP 160 TRACK, Lombardini: **102 dB (A)**

The above mentioned values have the common uncertainty for the method of measuring and the estimated variation in a product line for the type of machine. Detailed information on the measurements and results as well as estimation of uncertainty are found in a thorough report which can be given out on demand.
The sound level is of such a character that hearing protectors are prescribed during use of the machine.

6.4 Environmental instructions

When changing hydraulic oil or engine oil, oil and used oil filters and air filters must be handed in at an approved receiving station.

Oil spills must be avoided as much as possible. At oil spills, the spilled oil must be cleaned up and handed in at an approved receiving station.
Worn out parts must be disposed of for recycling.
When the machine is worn out it must be disposed of properly. Hydraulic oil and engine oil must be drained and handed in at an approved receiving station with oil filters and air filters.
The rest of the machine must be disposed of for recycling.

7 Operation of the machine

The wood chipper is equipped with two hydraulic rollers, a pressure compensated flow valve, a control valve and an operation bow with a reset handle (see Figure 11).

The operation bow must be in the stop position (0) during start (see Figure 12). After start you release the reset handle and pull the operation bow into the middle position (A) and the rollers will turn. The material is now pulled into the machine.

By pulling the operation bow towards you (B), the flow of oil in the control valve is turned and the rollers reverse, the material is now pushed out of the machine.

When the machine is either stopped (0) or reversed (B), the reset handle will automatically block the operation bow. It is now necessary to release the reset handle before the operation bow can be moved into the middle position (A) and the rollers can pull the material into the machine.
This reset handle is a safety measure so you cannot start the rollers by accident so they pull material into the machine.

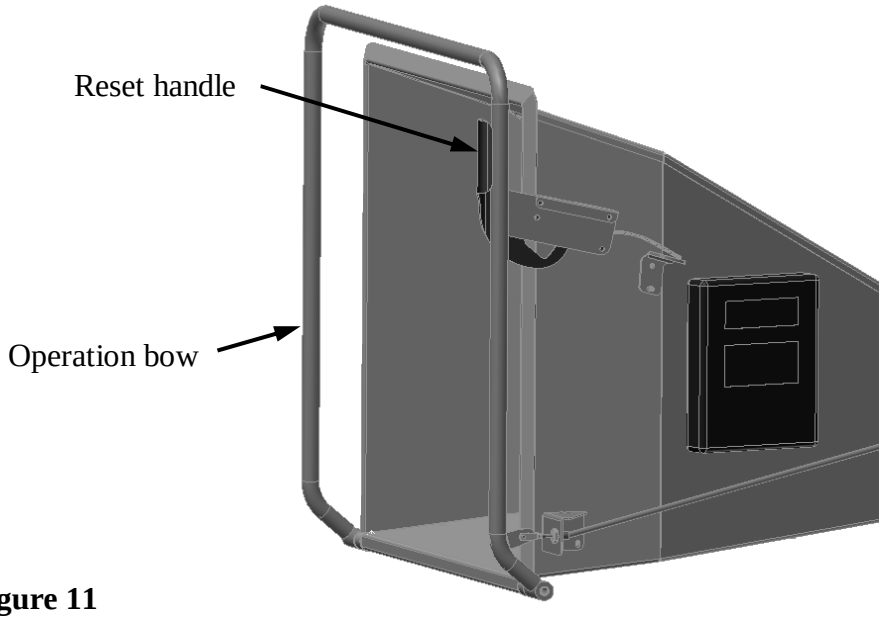


Figure 11

Feeding hopper TP 160 with operation bow and reset handle

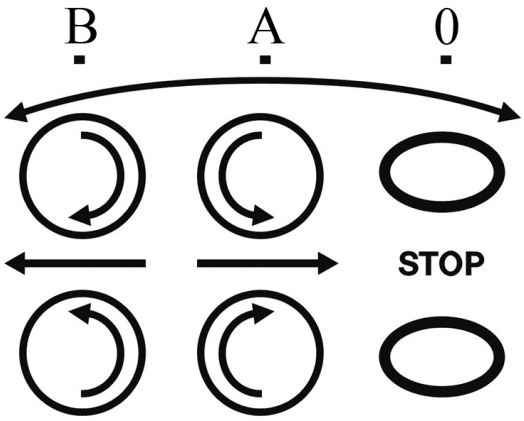


Figure 12

Direction to the operation bow

By turning the adjusting screw on the flow valve you can find the correct rpm. Never go to fast with the rollers because the wood will work like a brake if the pressure on the rotor is too big with the ensuing increase in use of fuel. Branches can get wrapped around the rollers if the rpm is too high.

In the table below (table 1) are stated the recommended rpm on the retract rollers at a desired chip length. The speeds vary with the number of revolutions on the PTO axle. The chip length can be regulated on the flow-regulation valve on the wood chipper for smaller chip lengths than indicated in the table.

7.1 Table 1 Regulating the number of revolutions for the retract rollers

Chip length **Model**	**Rotor** **Rpm**	**4 mm**	**6 mm**	**8 mm**	**10 mm**
TP160	1000	15	22	39	36

8 Maintenance

During all maintenance and repairs the machine and the drive must be shut off. Tractor mounted machines have to be placed on an even surface and be uncoupled from the tractor's PTO.

8.1 Maintenance schedule

Interval=> hours	**8 ⌛**	**50 ⌛**	**100 ⌛**	**200 ⌛**	**500 ⌛**	**1000 ⌛**	**1.000 m³**	**10.000 m³**
Lubrication of the PTO axle[1]	X							
Check of knives and anvil	X							
Tightening of all nuts and bolts[2]	(X)	X						
Lubrication of main bearings for rotor disc[3]			X					
Tube connection for PTO axle cleaning/lubrication[4]				X				
Oil change / Rotate gear[5]					X			
Lubrication of roller bearings[6]				X				
Changing of return filter for hydraulic pump[7]		(X)				X		
Change hydraulic oil[8]						X		
Anvil turn/change[9]						X		
Change bow in top rotor housing[10]						X		
Turn/change triangle and square scrapers[11]							X	
Grind flats on retract rollers[12]							X	
Check V-belts[13]		X						
Check ejector wings for wear						X		
Check casing for wear and tear								X

[1] The PTO axle is dismantled and 4 lubrication nipples are lubricated with Uniway Ep2 or something of similar quality.
[2] Bolts and nuts are tightened, the first time after 8 hours and then with an interval of 50 hours.
[3] Two lubrication nipples are lubricated with Uniway Ep2 or something of similar quality.
[4] The PTO axle is dismantled and the tube connection is pulled apart, cleaned and lubricated.
[5] The oil is changed for the first time after 50 hours, then every 500 hours. Pour W80/90 until it can be seen in the looking glass, 1.5 l.
[6] Two lubrication nipples are lubricated with Uniway Ep2 or something of similar quality.
[7] Changed for the first time after 50 hours and then every 1000 hours.
[8] The hydraulic oil is drained and new oil is poured on with 20 litres Hydraway HM 32 or something of similar quality.
[9] The anvil is turned/changed depending on need.
[10] The bow in the top rotor housing is changed depending on need if it is mounted.
[11] The triangle scraper in the rotor housing is turned/changed. The square scraper on the rotor is turned/changed.
[12] The retract rollers are sharpened.
[13] The tightening of the V-belts for the pump is checked.

8.2 Lubrication and oil

As standard, the machine is filled with hydraulic oil on a base of mineral oil with anti-wear additives which works under boundary lubrication terms at low temperatures i.e. under 60° C. The oil must meet the following demands:

- Normal working temperature from +30 °C to +60 °C.
- Minimum working temperature -30 °C.
- Maximum working temperature +90 °C.
- In the working temperature area the viscosity should be 35-75 cSt.
- The lowest viscosity allowed is approximately 20 cSt.

The wood chipper is filled with Statoil **Hydraway HM 32** from the factory. When changing the oil, use the same oil or a similar product. Do not mix oils of different types/brands.

The machine has been constructed so you can use biodegradable hydraulic oils with no problems as long as these oils meet the demands stated above.

Old hydraulic oil and engine oil as well as used oil filters and air filters should be handed in to the local receiving station.

Lubrication nipples are lubricated according to the maintenance schedule with Statoil **Uniway LI62** or a similar product mixed with Uniway LI62.

The machine is equipped with a hydraulic oil tank which is integrated in the rotor housing. The tank is equipped with a filler neck, an air release valve, a level glass and a return filter.

When changing the hydraulic oil, the filler neck is opened (see Figure 13).
The drain plug is unscrewed. The oil is drained into a canister for proper removal. When the tank is almost empty, the tank is sucked empty with an oil suction device. The drain plug is screwed back and new hydraulic oil is slowly filled in (20 litres for TP 160).
Oil is filled in until the level glass is half filled.

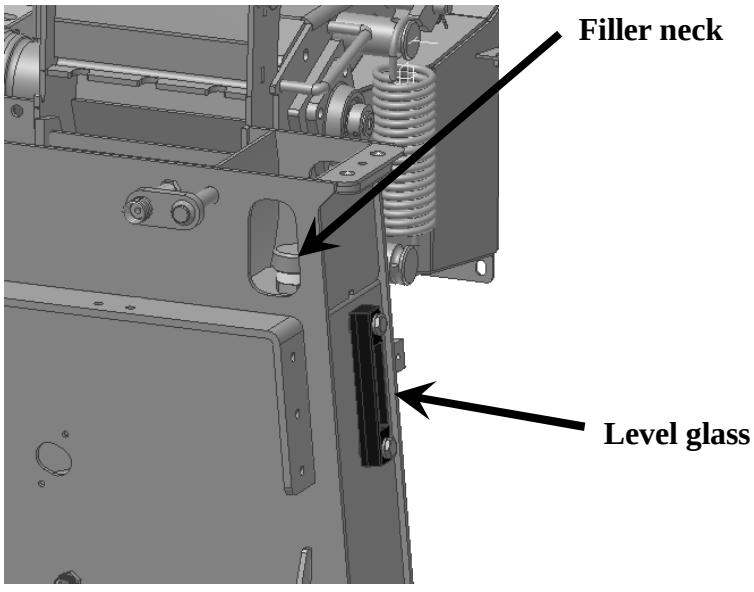


Figure 13 Filling hydraulic oil

8.3 Maintenance of the retract rollers

The retract rollers pull the material into the rotor disc and the knives.

The plates on the bottom retract roller must be kept sharp in order to keep the retract force.

This is how it is done:

Stop the machine and the drive. Uncouple the tractor's PTO. Check that the rotor is at a **complete** standstill. Turn the ejector tube so it faces the opposite direction of the rotor housing (Figure 7). Loosen the bolts which hold the two parts of the rotor housing together and open the rotor housing. With multigrip pliers or something similar, the spring is lifted off the top retract roller.
Grab the handle and open the roller housing and push the locking pawl into the lock in the side plate (see Figure 14). The roller housing is now secured from falling down.
Now the flat steels on the bottom retract roller can be grounded with an angle grinder.

Turn the rotor carefully with the operation bow in position forward or reverse. By doing this, the retract roller is turned so all the plates can be ground.

Remember that the welding seams are not to be ground away.

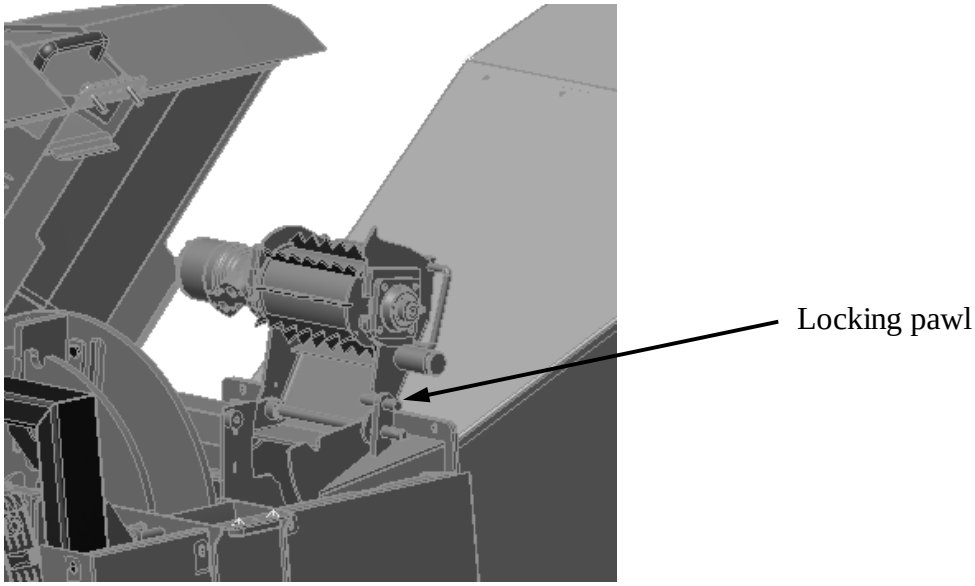


Figure 14 Securing with locking pawl

When the roller has been grounded, the top retract roller is lowered back in place. The spring is put back with multigrip pliers. Close the rotor housing and tighten the bolts.

8.4 Changing worn parts

8.4.1 Anvil

The anvil in the machine is used as wearing bar for the knife in order to cut the wood. The anvil must be sharp-edged otherwise the wood will bend down and the cut will become frayed. The machine is equipped with one horizontal anvil with two edges and one vertical anvil. The vertical anvil can be turned.

This is how it is done:

Stop the machine and the drive. Uncouple the tractor's PTO. Check that the rotor is at a **complete** standstill. Turn the ejector tube so it faces the opposite direction of the rotor housing (see Figure 7). Loosen the bolts which hold the two parts of the rotor housing together and open the rotor housing. With multigrip pliers the spring is lifted off the top retract roller and the roller housing is lifted and secured with the locking pawl (see Figure 14).

Dismantle the three bolts which hold the horizontal anvil. The anvil is taken out and turned/replaced. Before the anvil is put back, the anvil and the bearing surface must be cleaned carefully. The distance between the knife's edge and the anvil must be **0.5-0.9 mm**. (See Figure 15). The tightening factor for the bolts for the horizontal anvil is **100 Nm / 10 KPm.** (Accessory: torque wrench).

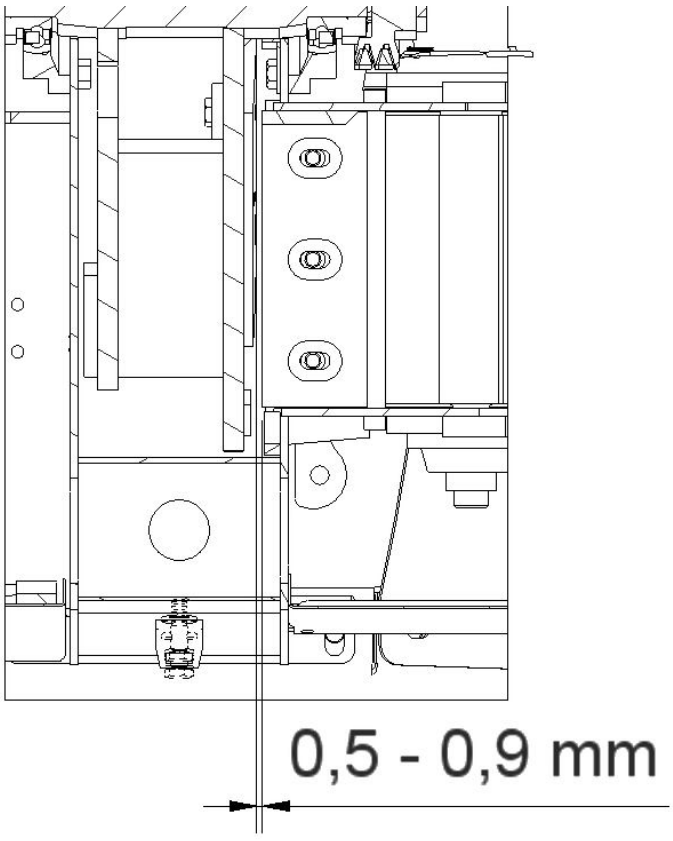


Figure 15 Distance between anvil and knife

The vertical anvil is unscrewed and removed from the inside. Before a new one is put in, the anvil and the bearing surface must be cleaned carefully. The anvil is set to a distance of **0.5-0.9 mm** to the knives. Use a new precision feeler gauge. The bolts for the vertical anvil are tightened to **50 Nm / 5 KPm**. (Accessory: In the tool kit there is a torque wrench).

When the anvils have been turned or replaced and all the bolts are tightened, the roller housing is lowered with the top retract roller in place. The spring is put back by using multigrip pliers.

Turn the rotor a few times to make sure that there are not any objects in the rotor housing. Close the rotor housing and tighten the bolts (see Figure 16).

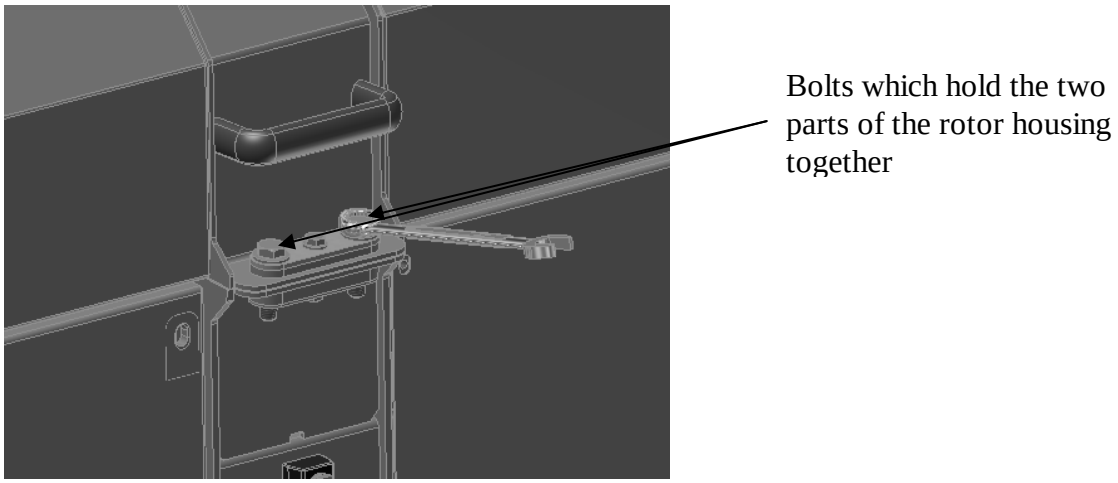


Figure 16 Tighten of bolts in the rotor housing

8.4.2 Knives

The machine is equipped with two knives.

The knives must always be changed in sets. The knives belong together in sets, also when they are ground so that they are always of equal width. If the knives are not of equal with the rotor will be out of balance which will lead to unnecessary strain on the bearings and vibrations in the whole machine.

This is how it is done:

Stop the machine and the drive. Uncouple the tractor's PTO. Check that the rotor is at a **complete** standstill. Turn the ejector tube so it faces away from the rotor housing (see Figure 7) Loosen the bolts which hold the two parts of the rotor housing together and open the rotor housing.

The rotor is turned until the rotor lock can go into one of the holes on the rotor. Now the rotor is locked (see Figure 17). Be careful that your fingers are not near the knives when the rotor is turned.

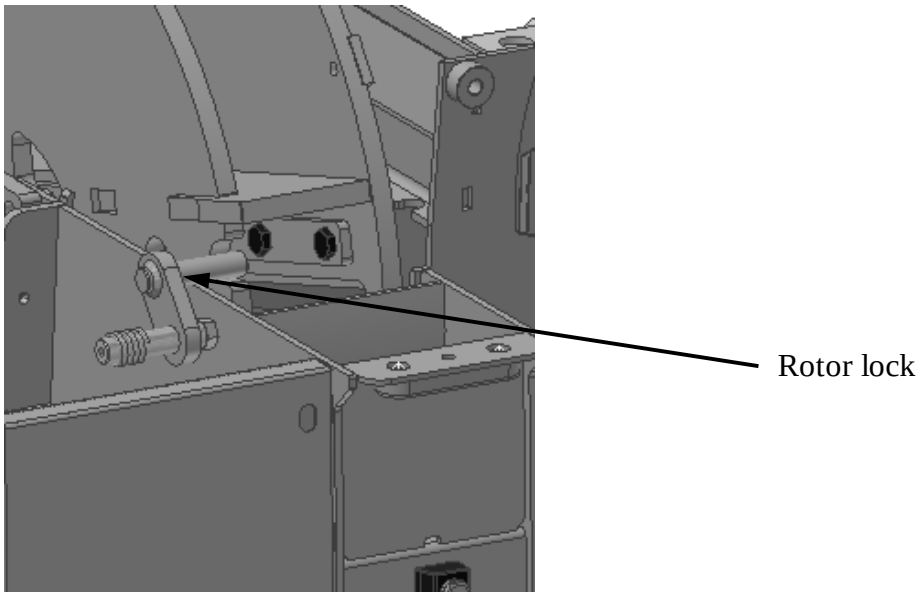


Figure 17 Locking the rotor with rotor lock

Remove the two nuts which hold the knife and the bearing surface to the rotor. Take out the knife. The bearing surfaces on the chipping disc and the knife must be cleaned properly before fitting the knives. On fitting the nuts **must** be slightly greased (μ=0,125) meaning thin oil, WD 40 or something similar. Copper grease, MoS_2 or similar low friction grease must **not** be used.

Check that the distance between the knife's edge and the anvil is set correctly at **0.5-0.9 mm**.

The nuts must be tightened with **110 Nm / 11 KPm**. (Use a torque wrench for this which is included in the tool kit. This can be bought as an accessory).

When the knives are changed, the rotor is turned a few times to make sure that there are not any objects in the rotor housing. Close the rotor housing and tighten the bolts (see Figure 16).

8.4.3 Scrapers and facing plate

The machine is equipped with two square scrapers on the rotor disc, a triangle scraper in the rotor housing and a facing plate in the ejector tube (see Figure 18).

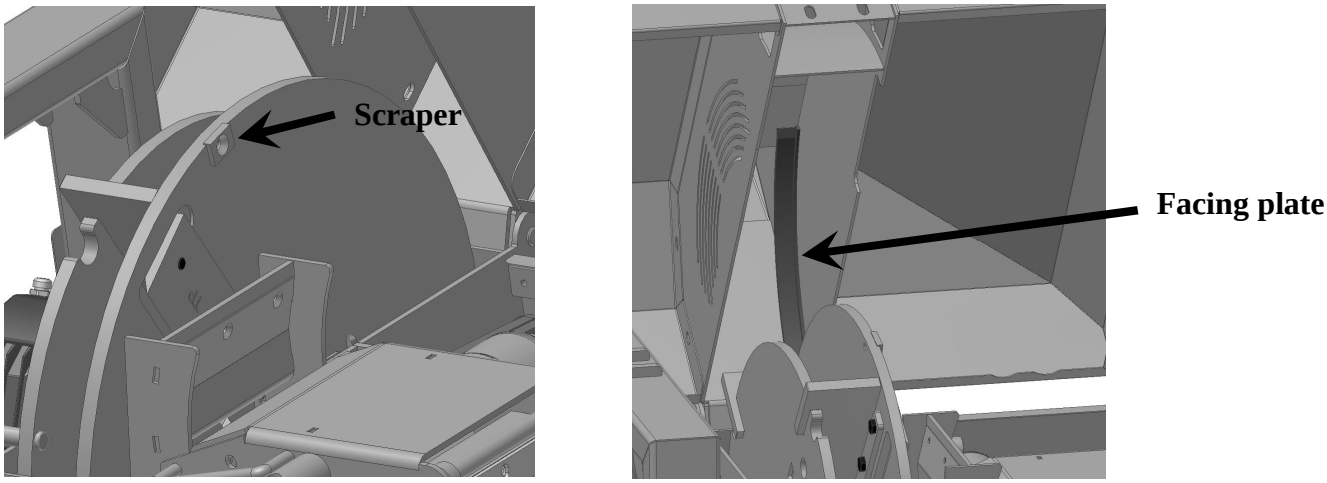


Figure 18 Placement of the scrapers and the facing plate

The purpose of the scrapers is to remove any material which might get stuck to the knives.
At the same time the square scraper on the rotor removes material which falls off in front on the chipping disc.
This reduces the wear to the casing and reduces the consumption of fuel.

The square scrapers can be turned once before being changed, while the triangle scraper and the facing plate should always be changed when they are worn.

This is how it is done:

The rotor is turned until the rotor lock can go into one of the holes on the rotor. Now the rotor is locked (see Figure 17). Be careful that your fingers are not near the knives when the rotor is turned.

Dismantle the countersunk bolts which hold the square scraper on the rotor. Turn the square so that a sharp edge points up. Clean the block and the bearing surface. Put the square scraper back. If it is worn on two edges, the square scraper has to be changed. Always change the square scraper on the rotor in sets. Change the triangle scraper when it is worn.

The facing plate is mounted in the top part of the rotor housing and can easily be changed by dismantling two bolts on the outside of the rotor housing. If chip quality is not important the facing plate in the ejector tube can be removed. This will increase the capacity of the machine and save fuel. The facing plate has to be dismantled when chipping wet conifer with a lot of needles. Then a good ejection is ensured.

When the scrapers have been turned or changed, the rotor is turned a few times to make sure that there are not any objects in the rotor housing. Close the rotor housing and tighten the bolts (see Figure 16).

8.4.4 Adjusting the V-belts

Pump transmission (PTO and MOBILE models)

The retract rollers are run hydraulically. The hydraulic pump to the retract rollers is run by V-belts. The V-belts need to be check regularly or when the belts are suspected to be slack.

This is how it is done:

Stop the machine and the drive. Uncouple the tractor's PTO. Check that the rotor is at a **complete** standstill by looking at the two-coloured axle end. Turn the ejector tube so it faces away from the rotor housing (see Figure 7). Loosen the bolts which hold the two parts of the rotor housing together and open the rotor housing.

Loosen the four screws which hold the hydraulic pump in place and adjust the tension by turning the adjusting screw. Used belts are allowed to bend 5.5 mm when they are pushed down with 37 N (3.7 kg), for new belts this number is 42 N (4.2 kg) (See Figure 19). The belts can be measured with a gauge for this purpose which can be bought as an accessory.

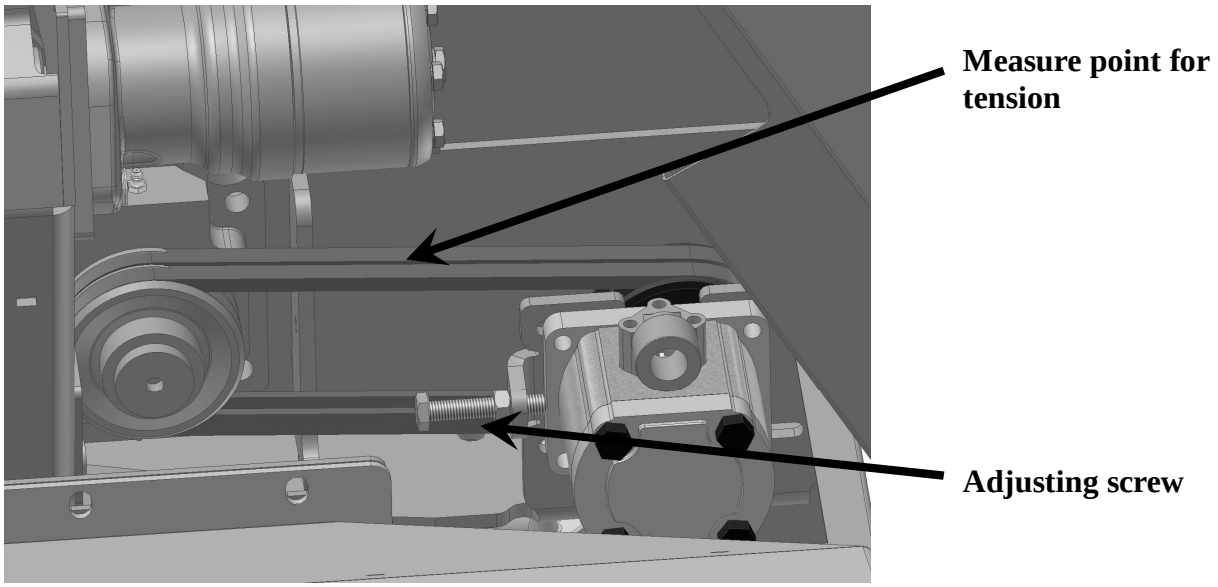


Figure 19 Adjusting the tension

When the V-belts have been tightened, the rotor is turned a few times to make sure that there are no objects in the rotor housing. Now the rotor housing has to be closed and the bolts have to be tightened (see fig. 16).

Pumpetransmission (TRACK model)

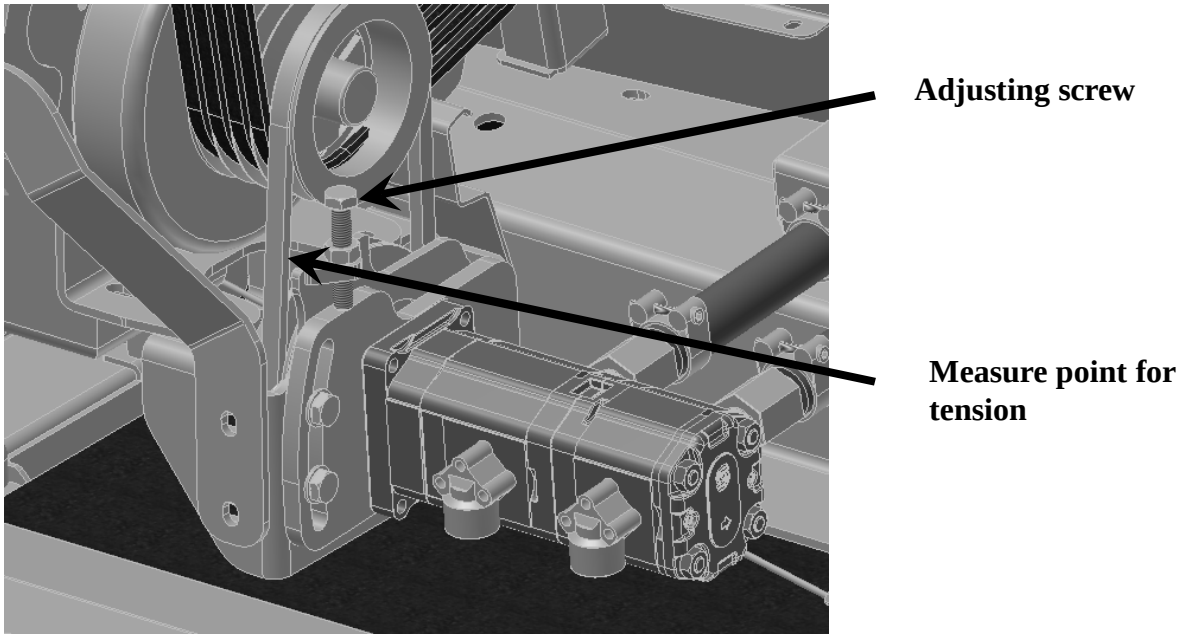
The retract rollers and the belts are run hydraulically. The hydraulic pump for the retract rollers and belts is run by a v-belt. The v-belt must be checked regularly or at suspicion of loose belts.

This how it is done:

Stop the engine. Check that the rotor has stopped **completely**. Turn the ejector tube so it faces away from the rotor housing (Figure 7). Loosen the bolts that hold the two parts of the rotor housing together and open the rotor housing.

Loosen the bolts that hold the hydraulic pump in place and adjust the tension by turning the adjuster screw. Used belts may stretch 3.6 mm when they are being pushed down with 46 N (4.6 kg), for new belts this number is 52 N (5.2 kg) (see Figure 20). The belts can be measured with a measuring instrument for that purpose which can be bought as an accessory.

Figure 20 Adjusting the tension



8.5 Grinding of knives

It is very important for the quality of chips that the knives are sharp. They have to be checked at least once a day. The grinding interval of the knives can be prolonged by grinding them with a carborundum stone regularly.

The grinding can be done as wet grinding with a bond stone (see Figure 21). **Never** use an angle grinder or a similar tool for grinding the knives. Wet grinding machines can be bought as an accessory at Linddana.

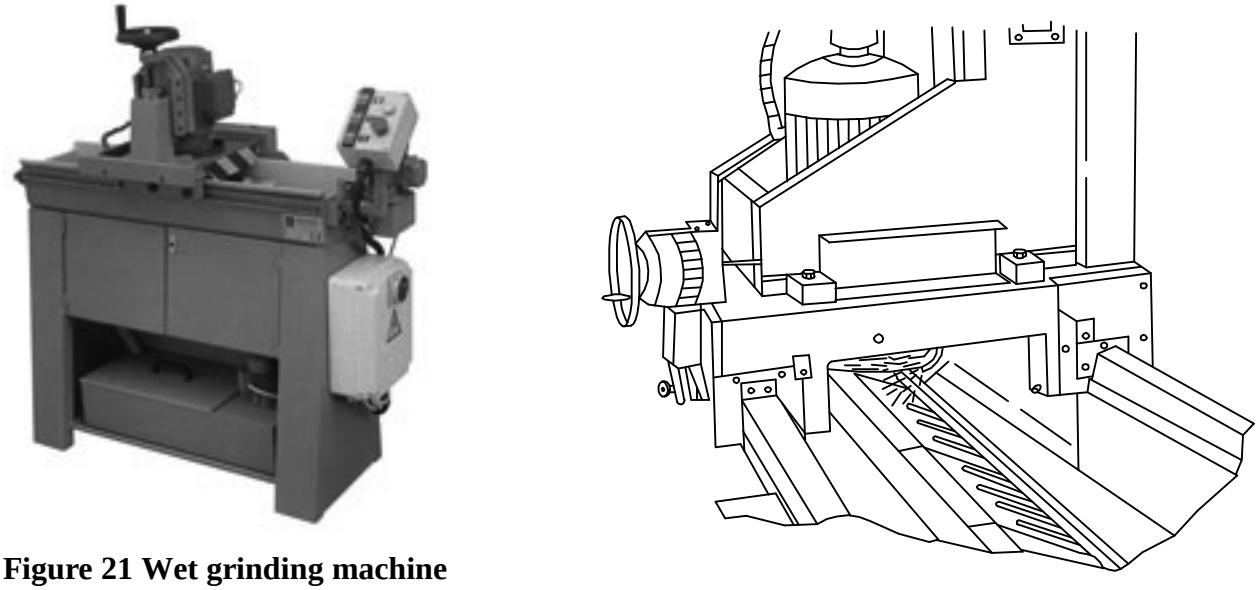
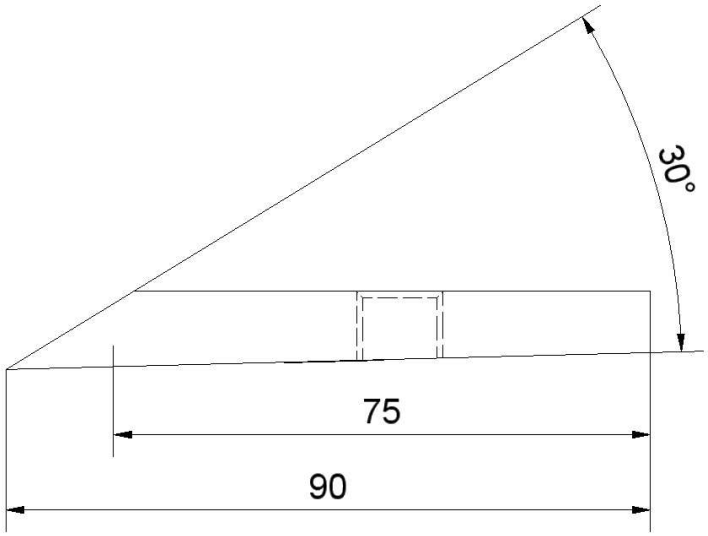


Figure 21 Wet grinding machine

When grinding knives you have to pay attention to the width of the knife set. The width has to be the same because of the balancing of the rotor. Therefore, the knives always have to be ground in sets. The knives must have a measurement of min. 75 mm (See Figur 22). After that they must be thrown away.

The edge of the knives must be ground at an angle of 30°. (See Figur 22).



Figur 22 Grinding angle and minimum knife width for chipping knives

9 Special instruction for TP 160 MOBILE

TP 160 MOBILE is a trailer mounted wood chipper comprised of a trailer upon which a wood chipper with own engine is mounted, registered as a trailer tool. The trailer can be coupled to a vehicle with a ball and socket head as a coupling without inspection. When coupling, the 7/13-pole connector and the safety chain must be coupled to the vehicle and the supporting leg must be raised. The hand brake is released before driving.
Check that lights, brake lights and turn signal lights work before driving.

	TP 160 MOBILE
Trailer width:	1416 mm
Trailer length incl. ball and socket head:	3573 mm
Tire assembly:	155/80R13
Tire pressure:	4,5 bar = 65 psi
Engine type:	Lombardini LDW 1404

In order to avoid destroying the electrical system, the following points must be respected:

1. Battery connections must be clean.

2. When using a battery charger, the earth cable on the battery must be dismantled.

During transport on public roads, the ejector tube has to be turned in the opposite direction of the traffic direction and properly secured.

WARNING:
Always stop the engine when servicing the wood chipper and the engine. When changing knives, the bonnet must be lifted first, and then the 2 bolts which hold the top of the machine can be loosened.
A safety switch makes sure that the engine cannot be started when the bonnet is lifted.
The switch will stop the engine if the bonnet is opened without stopping the engine first.
If the safety switch is defective, it must be changed immediately.

Instruction for wood chipper: See TP 160 PTO

TP 160 MOBIL and TRACK are equipped with kW26(35hp) Lombardini.
See the manual for the engine.

It is necessary that when signing in for repairs that you point out that it is a guarantee matter. By doing this, we have the opportunity to write a report and keep and test the parts as prescribed by the factory.

It is too late to refer to the guarantee after repairs have been done.

The factory guarantee runs out two years after date of purchase.
See other existing terms of sale and delivery.

For ordering spare parts
Remember to state: model, year of manufacture and spare part number.

Notice: Always use original parts otherwise the guarantee is void.

Warnings:
BE CAREFUL, if you are going to touch an engine that is running or has just been stopped. Different components – especially the exhaust system can be red hot even though you cannot see it.

The oil dipstick may only be removed from the engine to check the oil or to fill new oil in the engine.

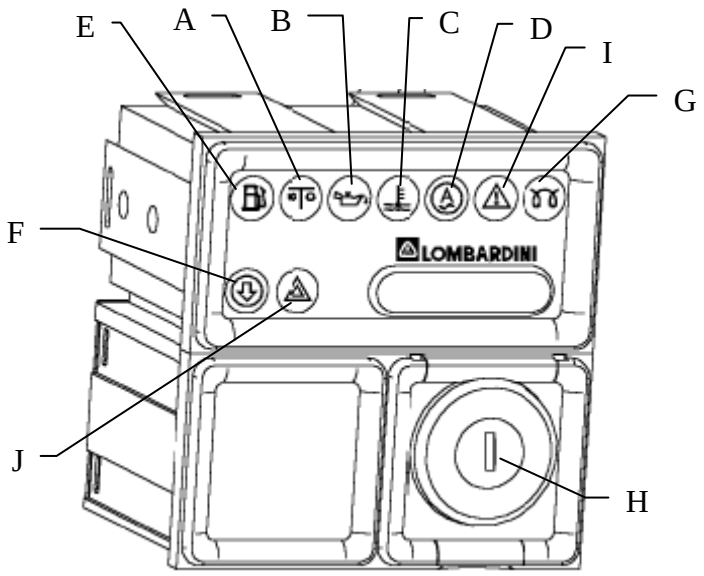
The filler cap on the cooler may only be removed when checking the level of liquid or when filling new coolant. Only remove the filler cap when the engine is cold. When the engine is hot, the cooling system is under pressure and it can be dangerous to loosen the cap because you may get scalded. After draining you must remember to screw the cap back on tightly.

When filling up with fuel you must avoid open flames.

Never let the engine run in closed, poorly ventilated spaces.

Before start, electrical wiring, connections and isolation must be checked.

Startbox



A = Normal operation
B = Oil light
C = Temperature
D = Charging light
I = Warning light (not used)
E = Fuel indicator (not used)
F = Air filter indicator lights up when air filter is clogged
G = Heater plug/preheat
H = Ignition key
J = Warning light (not used)

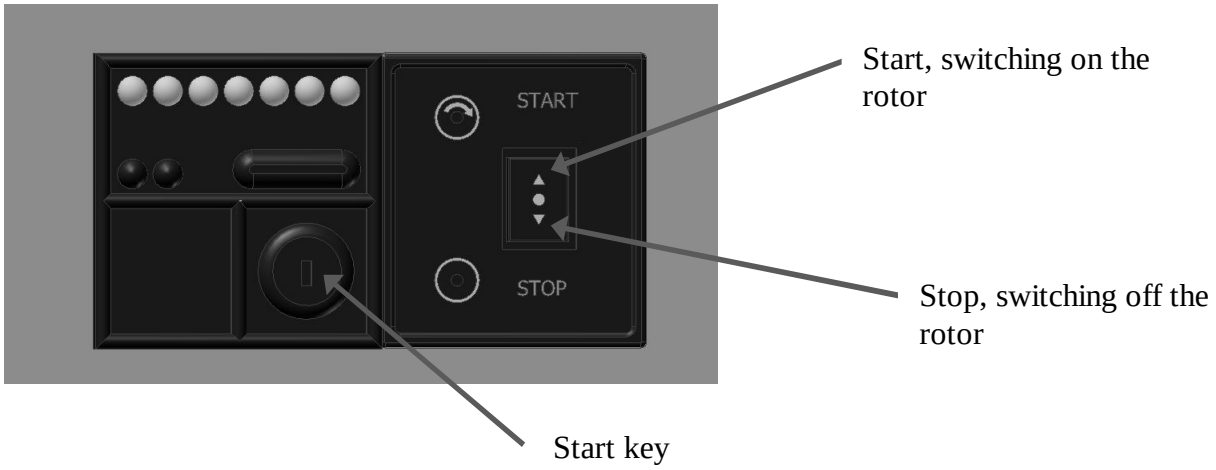
Start:
The key is turned clockwise and the light for preheat lights up. When the light turns off the engine can be started.
Notice: All warning lights must be turned off during operation.
If the engine does not start after 20 seconds then wait a minute and try again.
If the engine does not start after two tries, then start troubleshooting and use the troubleshooting table.

When the engine has started, it must run idle in order to get thoroughly hot.

-20°C and under	approximately 5 minutes
-20°C to -10°C	approximately 2 minutes
-10°C to +5°C	approximately 1 minute
over +5°C	approximately 20 seconds

during the first 50 hours of work the engine must not be loaded with more than 70% of the maximum performance.

TP STARTER®



Starting the wood chipper:

Start the engine with the key and let it run idle for a few minutes.
Now push the top of the button (Start), TP STARTER® will now automatically cut in the rotor and at the same time the engine revolutions are increased to the max. engine rpm. The wood chipper is now ready for operation.

Stop:

Stop putting material in the wood chipper and wait until nothing comes out of the ejector tube.
Push the bottom of the button (Stop), TP STARTER® will now automatically cut out the rotor, and at the same time the engine revolutions are slowed to idle.
The engine must run idle for a few minutes before it is stopped.
Stop the engine by turning the start key counter-clockwise.

If the motor is turned off with the key before TP STARTER® has cut out completely then the motor cannot be started.
Turn the key so the power is on and push the button (Stop). Then it is cut out completely an the motor can now be started.

Cleaning the filter in front of the cooler

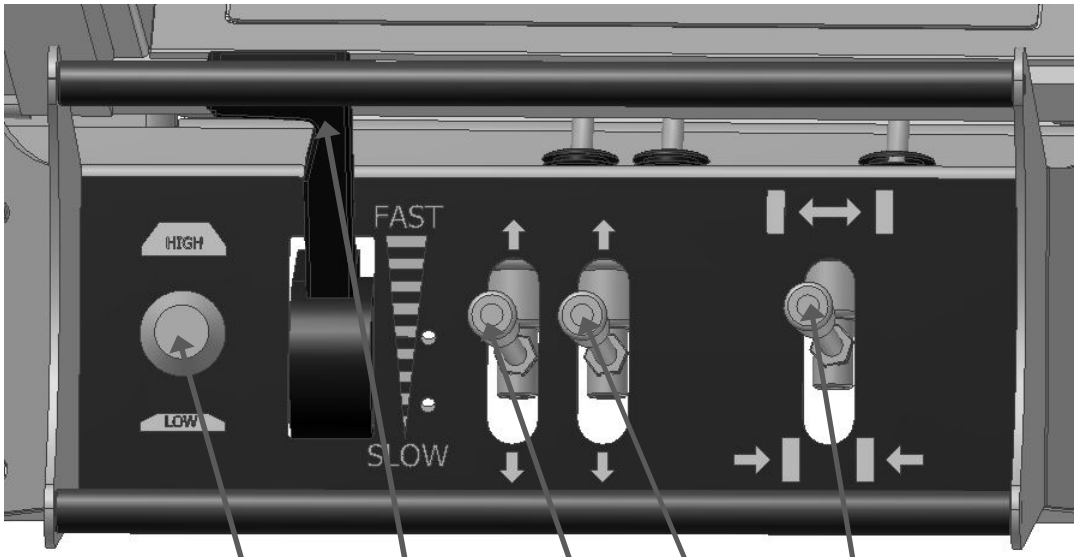
In front of the cooler a filter is mounted that collects the particles that are so big that they cannot pass through the cooler itself.
cleaning is done like this:
Stop the wood chipper. Open the engine hood and lift the filter out of the “track”. The filter can now be cleaned like this:
- Knock off the dust carefully by hitting the frame of the filter on the ground or a piece of wood.
- Clean with compressed air from the ”cooler side”.
- Clean with high pressure cleaner. Only used for extreme clogging and must dry before using the wood chipper.

Generally you get less stops by making sure the wind does not lead dust from the ejector tube directly into the cooler.

10 Special instruction for TP 160 TRACK

10.1 Operation

Operation of TP 160 TRACK is controlled from the manoeuvre board.



Forward: belts in outer pos.
Back: Belts in inmost pos.

Forward: Right belt goes forward.
Back: Right belt goes backward.

Forward: Left belt goes forward.
Back: Left belt goes backward.

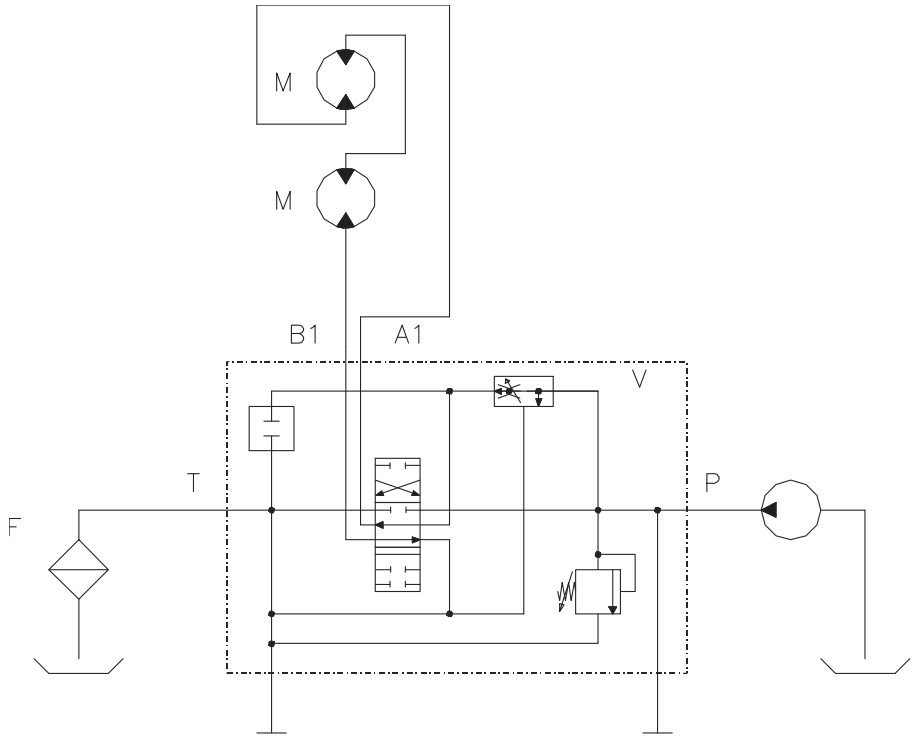
Forward speed, engine rpm.

Hydraulic gear change

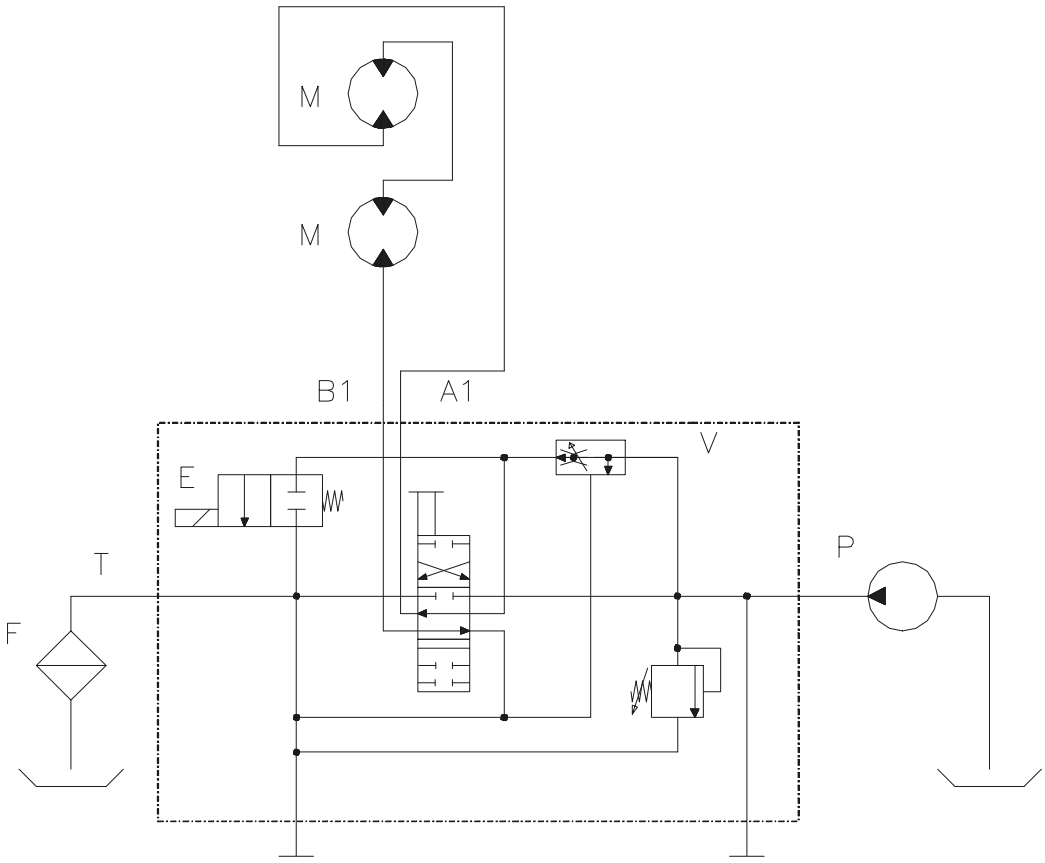
When the engine has started, the machine can drive around the terrain. Activate the two forward drive handles at the same time forward and the machine will drive straight forward. If only the left handle is pushed forward, the machine will turn to the right and vice cersa if the right handle is pushed forward. If the two handles are activated in opposite directions, the machine will turn around itself.
The handle on the right side controls the width setting for the belts. They are activated so the belts are either together or completely apart.
the forward drive speed can be regulated from 0.35 to 3.7 km/h with the hydraulic gear change (HIGH is twice the speed of LOW) and with the engine rpm that are regulated with the throttle.
If the wood chipper is running and the forward drive handles are activated, the retract rollers will stop until the forward drive handles are released again.

NOTE
TP 160 TRACK cannot drive on more than 20° slopes at continuous operation, but briefly (max. 10 min.) it can drive on 30° slopes.

11 Hydraulics diagram, TP 160 without revolution guard

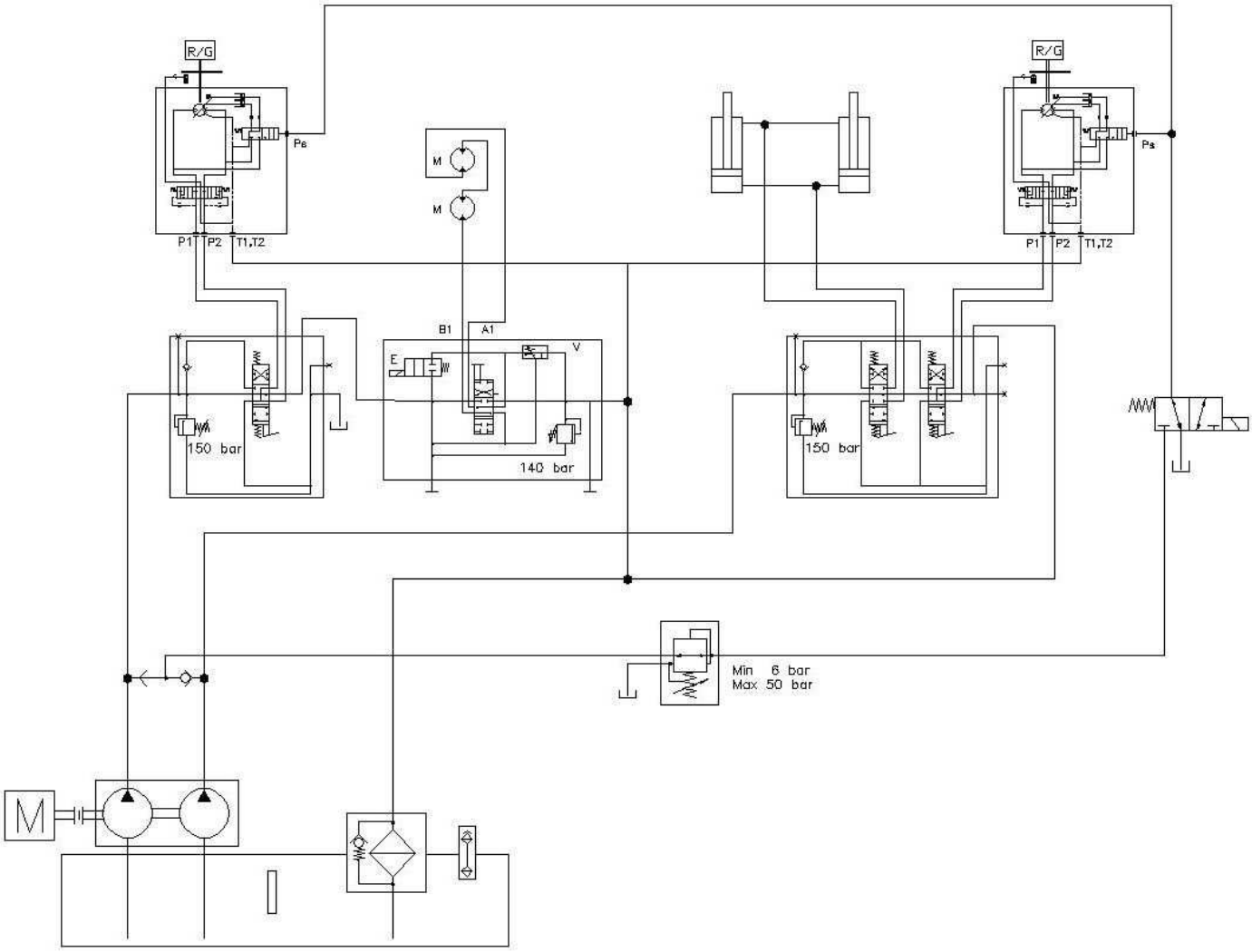


12 Hydraulics diagram, TP 160 with revolution guard



13 Hydraulics diagram, TP 160 TRACK with revolution guard

Track Motor Feeder Valve Track Extension Track Motor



14 Instruction for revolution guard TP PILOT 01

14.1 Overall operation

The TP Pilot gives you the opportunity to monitor the revolutions of the engine and retract rollers and sounds an alarm when low or high limit values are exceeded.

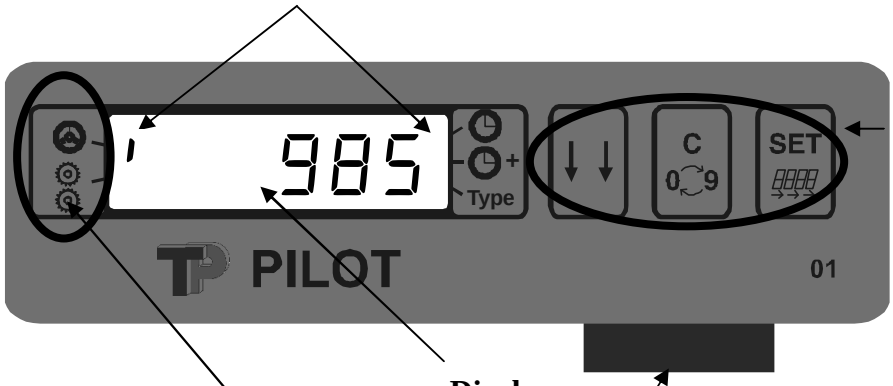
Different functions and display indications

The following functions are included in the computer:

Symbol:	Denomination:	Limit value:
	Programmable revolution guard **Rotor** (used with sensor for rotor rpm)	1 – 9999 rpm (in practice not under 12 rpm)
	Programmable revolution guard **Roller** (used with sensor for roller rpm)	1 – 9999 rpm (in practice not under 12 rpm)
	Work time	0:0 – 99:59 hours: minutes 9999 whole hours
+	Work time total	0:0 – 99:59 hours: minutes 9999 whole hours
Type	Choice of machine type	1 – 12

Overview of the monitor

Marker
- Display marker (vertical or horizontal) at the sides of the display indicates which function is shown at the moment



Operation keys
- Change between display indications
- Starting changes to the marked value
- Programming new number values and reset

Display

Display indications
- Shows the possible functions (values) which can be shown in the display

Connector
- Input for enclosed sensors and outputs

Explanation for operation keys


-Key

By pushing the  key you change between the different display indications (seen in the window at the left end of the display) and through that the different functions of the monitor. With every push on the key, the position of the marker/display indication changes one step. The marker starts in the top left corner and then moves ”down”.

The key is also used to leave the change menu (cf. next paragraph).


-Key

The  key is used for programming (changing/deleting) values in the computer, e.g. putting in alarm values for high and low revolutions.

With the  key you can navigate to the function/indication you want to change/programmed. Then the  key is held for approximately 1 second until the number starts blinking. With the  key the first digit in the value you want to program is now changed or deleted. By pushing the  key, the marker moves to the next digit in the value and so on until all the digits are changed/programmed. The programming menu is left by pushing the  key and the programmed value is stored in the memory.


-Key

With the  key the values that are going to be programmed (and that you have made blink by using the  key) are changed or deleted.

The computer is equipped with an internal memory which saves all values when the power is cut.

14.2 Programming

The TP Pilot is pre-programmed with 13 machine types with which the factory settings for the current machine type can be chosen. See setting table for machine types.
In addition to this, the following parameters can be adjusted as desired.

Parameter	Meaning	Comment
L(ow)	Lowest rpm	Deviation from normal revolutions. If the machine is loaded to under ”lowest rpm”, the feeding is uncoupled so that the machine has the possibility to get to normal rpm where the rollers start.
h(igh)	Normal rpm	Normal revolutions that the rotor disc has to hold and where the feeding starts.
T(ype)	Machine type	According to the setting table for machine types.

An alarm is sounded on the retract roller. If the rpm on the retract roller goes over the upper limit value (Roller blink) the display will blink between ’0’ and ’9999’.
Adjust the roller speed by turning the manual regulation of the oil quantity for the oil engines.
When the roller speed goes under the limit value again the current rpm is shown again.

Here you see an example for programming of limit values on the rotor. Changing of low value to 850 rpm and high value for 1000 rpm.

Example of changing low limit value to 850 rpm and high limit value to 1000 rpm		
Push key:	**The display shows:**	**Explanation:**
↓↓	0	Find the revolution guard for the rotor by pushing the key repeatedly.
SET	L _ _ _ 0	Hold the key down for 1 second until ”L” lights up to the left and the first digit (of 4) is blinking.
C	L x _ _ _	Push the key until the digit has the correct value. Notice that zero (0) cannot be put here.
SET	L x _ _	Push to put/change the next digit (the second digit will blink).
C	L 800	Push the key until the desired digit is correct.
SET	L 800	Push to put/change the next digit (the third digit will blink).
C	L 850	Push the key until the desired digit is correct.
SET	L 850	Push to put/change the last digit.
C	L 850	Push the key until the desired digit is correct.
↓↓	h x000	Push the ”arrow” key and ”h” (high) will light up to the left and the first digit (of 4) will blink.
C	h 1000	Push the key until the desired digit is correct.
SET	h 1000	Push to put/change the next digit (the second digit will blink).
C	h 1000	Push the key until the desired digit is correct.
SET	h 1000	Push to put/change the next digit (the third digit will blink).
C	h 1000	Push the key until the desired digit is correct.
SET	h 1000	Push to put/change the last digit.
C	h 1000	Push the key until the desired digit is correct.
↓↓		Push out of the programming menu.

When an alarm limit on the rotor is exceeded, the current rpm is still shown while the retract rollers are stopped. If the rotor has been under the lower limit value, the retract rollers will start when the rotor’s rpm is over the set upper limit value ’h’ (ex. 1000 rpm).

Setting table for included machine types.

Model	**Rotor Rpm**	**Rpm 1 L**	**Rpm 1 h**	**Type Nr.**
TP 160	*1000*	850	1000	13

Table for the roller's rpm based on position of the knives.

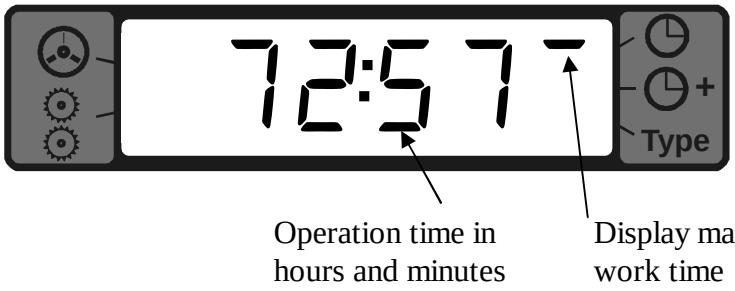
Position knives / Model	Rotor Rpm	4 mm Rpm	6 mm Rpm	8 mm Rpm	10mm Rpm
TP 160	*1000*	15	22	29	36

From the above table the roller's rpm can be seen for the current position of the knives.
The rpm is set by means of the regulation screw on the control valve.

Work time on the machine:

Indication of rotation time on the machine.

In this display indication, the middle horizontal marker is activated on the right side. The complete rotation time will be shown as illustrated in the following figure.



Operation time in hours and minutes

Display marker for work time

- Over 99:59 hours/minutes will be shown as whole hours.

Resetting the rotation time on the machine.

Resetting the rotation time (operation time) on the machine can be done at any time. First you push the ↓↓ key until the display for work time appears. After this, the following is typed in:

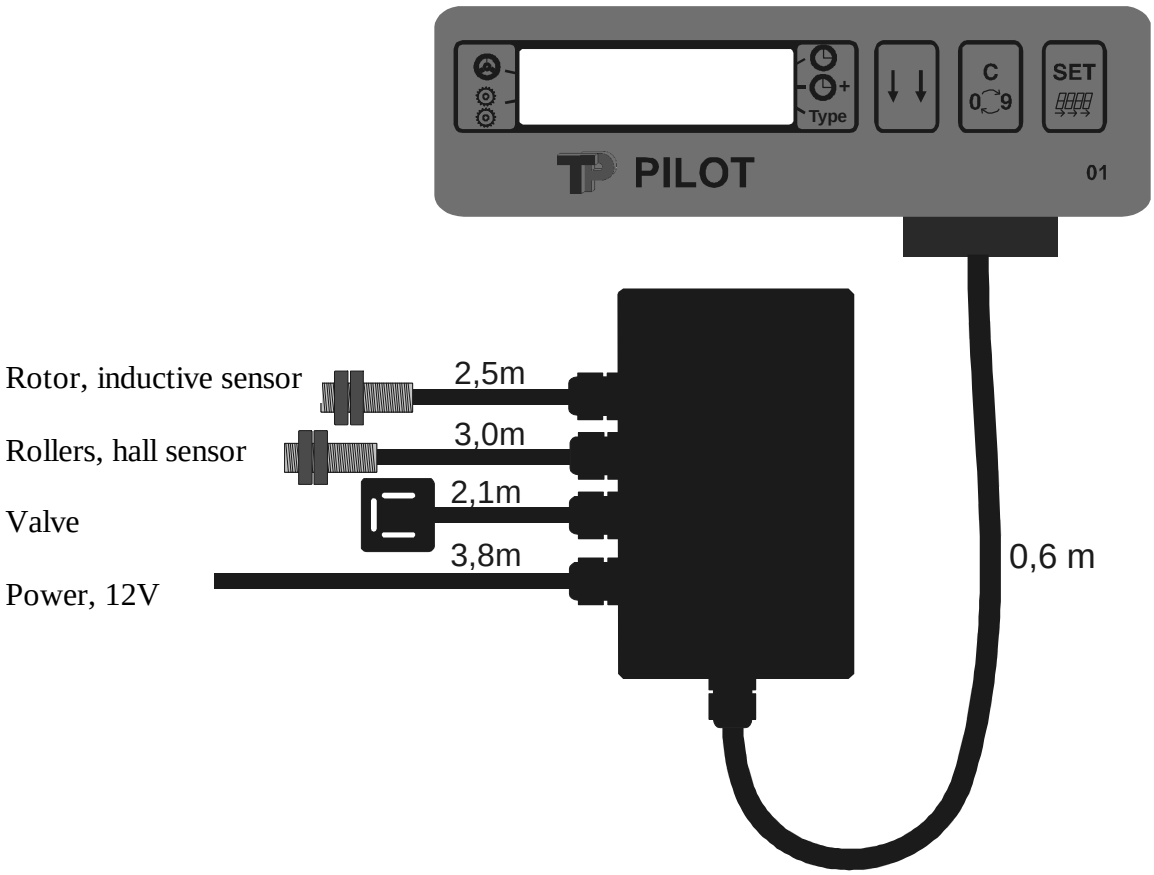
Push the key:	The display shows:	Explanation:
↓↓	72:57 (example)	Find job hours by pushing the key repeatedly.
SET	72:57	Hold the key in for five seconds until the number blinks.
↓↓	00:00	Push the key to reset the rotation time.

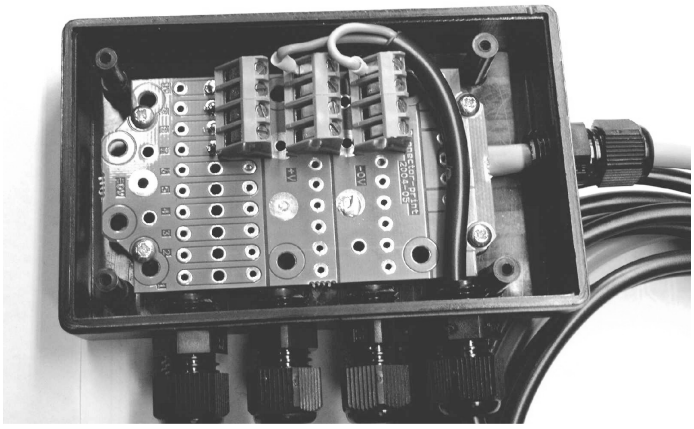
Notice: The total hour counter (bottom vertical marker) cannot be reset. It is used for registering the machine's total work time.

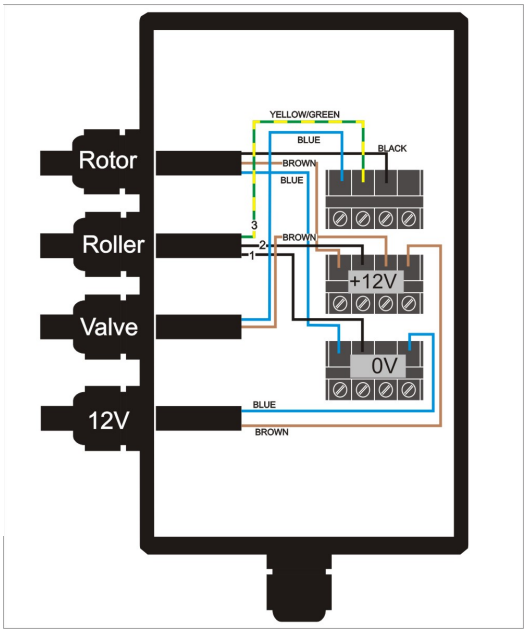
14.3 Mounting

Mechanical setup and mounting diagram

Mounting diagram when using electronic sensors (hall or inductive sensors):







14.4 Technical data

Display:	6 digits.	
Poor supply:	12 Vdc / 1,24 A	
Temperature influence:	The TP Pilot is completely operational within	-10 / +70 °C.
Pulsations from sensor:	Max. 225 pulsations/sec.	

Notice:

The control/monitor has been designed for use in connection with the functions described. Any other use of the control/monitor as it is risky and exempts the distributor of the control from any type of responsibility.

15 Troubleshooting for wood chipper TP 160

Check possible causes before contacting the distributor.

Problem / Possible cause	Solution
The rollers are not spinning satisfactorily:	
Not enough oil in the hydraulics system	Fill up with hydraulic oil
The flow valve is screwed out too far	Turn up the flow
The stationary roller is blocked	Clean under and behind the roller
The bypass valve is dirty	Clean the bypass valve
The revolution guard is blocking	Increase the rpm on the rotor
The operation bow is in the 0 position	Put the operation bow in the A position
The rollers are not pulling satisfactorily:	
Not enough flow	The flow valve is turned (opened)
The V-belts are too slack	Tighten the V-belts
The hydraulic oil gets too hot	Let the machine cool down while checking why
Too poor viscosity of the hydraulic oil	Change the hydraulic oil
The hydraulic filter is clogged	Change the hydraulic filter
The oil pump is worn or damaged	Change the hydraulic pump
The oil engine is defective	Change the oil engine
The pressure control valve in the control valve is dirty	Clean the pressure control valve
Chip quality is not satisfactory:	
The knives are dull	Grind the knives
The anvil is worn	Turn/change the anvil
The knives are worn too far down (<106 mm)	Change the knives
The distance between knife and anvil is too big	Adjust the distance between the knives and anvil
Slotting breaker not mounted or worn	Mount or change the slotting breaker
Poor ejection of the chips:	
Not enough drive	Not enough effect on the PTO axle or the engine
Scrapers are worn	Change the scrapers
The facing plate in the top part	Remove the facing plate in the top part
Not enough revolutions on the machine	Increase speed to maximum revolutions

16 Guarantee obligation for wood chipper

The guarantee is valid for 24 months after date of purchase for the relief of faults which are provable to the material or manufacture. The guarantee covers defective components which are repaired or changed.

Transportation costs and wages for changes are the responsibility of the customer.

Upon any claims, the changed parts must be sent to Linddana for investigation.

Linddana alone decides whether the claim can be approved.

The following is an excerpt from Linddana's Terms of Sales and Delivery (item 4 and 5).

Claims

Any and all risk concerning the goods is passed to the buyer at the time of delivery of the goods. A claim concerning the goods has to be done in writing to Linddana as quickly as possible, and no later than 8 days after delivery. If Linddana has not received the claim before the deadline stated, the objections to quantity and quality that the buyer might have will lapse.

Linddana is entitled and obligated to correct any and all faults which are caused by the construction, material or manufacture. Linddana alone determines whether the remedy is to be done with repairs or changes of the defective parts. In case of repairs, the buyer is obligated to deliver and collect the goods sold in the workshop determined by Linddana at no expense to Linddana. In case of changing the defective parts, the buyer is obligated to send in the defective parts to Linddana at no expense to Linddana. Linddana is entitled to changing the defective goods.

Linddana's responsibility only covers faults which occur within a year of the goods sold being delivered.

Linddana has no liability besides those stated in the present item. This includes any loss the fault might cause including loss of work, loss of earnings and other economical implication losses.

Guarantee conditions

If Linddana has decided to grant a guarantee, then this has faults in the construction, material or manufacture. A guarantee granted by Linddana does not cover faults which occur as a result of imperfect maintenance, incorrect mounting, changes made by the buyer or wrong use of the good. The guarantee furthermore does not cover normal wear and tear or deterioration. Linddana's guarantee obligation presupposes that the buyer documents that a stated fault is not due to the conditions which are exempt from the guarantee cf. afore-mentioned.

The buyer must let Linddana know in writing about any faults to the goods sold no later than 8 days after the fault should have been realized by the buyer. If the buyer does not let Linddana know before the expiration of this deadline and before the guarantee period runs out, the buyer looses the right to make any claims concerning the fault.

Linddana is entitled and obligated to remedy any faults which are covered by a guarantee granted by Linddana. Linddana alone decides if the remedy is to be done as repairs or changes of the defective parts, everything under the terms stipulated in item 4.

Linddana has no other liability for those faults. This includes any loss the fault might cause including loss of work, loss of earnings and other economical implication losses.

The guarantee does not cover:

- If a defect with just cause can be attributed to inappropriate use.
- Use of unoriginal spare parts, including worn parts.
- Wrong adjustment or use of the machine.
- Use of wrong lubricant or hydraulic oil.
- Wear on cross at PTO axle.
- Tightening spring for rollers.
- V-belts.
- Knives and anvil which break because of foreign bodies in the machine.

17 Technical data wood chipper

Type	TP 160 PTO	TP 160 MOBILE	TP 160 TRACK
Chipping principle	Disc chipper	Disc chipper	Disc chipper
Rotor disc diameter, mm	660	660	660
Number of revolutions PTO rpm*	540	1000	1000
Knives, pieces	2	2	2
Effect need min/max kW/(HP)	22-59/(30-80)	26/(35)	26/(35)
Max. Wood diameter, mm	160	160	160
Chip length, mm	10	10	10
Weight, kg	585	822	1195
Height, mm	2352	2440	2416
Width, mm	1170	1416	1130
Length, mm	2094	3573	2878

PTO transmission axle: Walterscheid type W400 with free running.

Rights to changes in the construction and specifications without previous notice reserved.

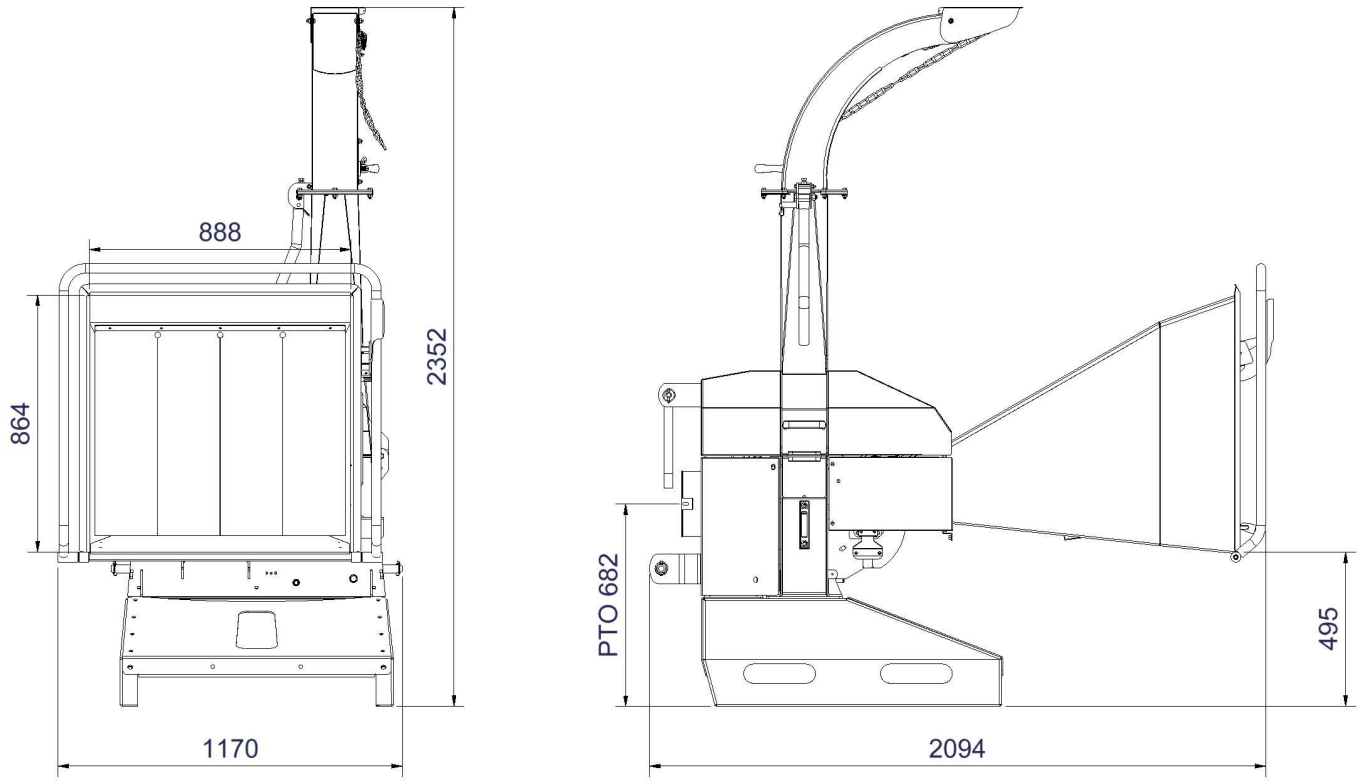


Figure 23 Dimensional sketch TP 160 PTO

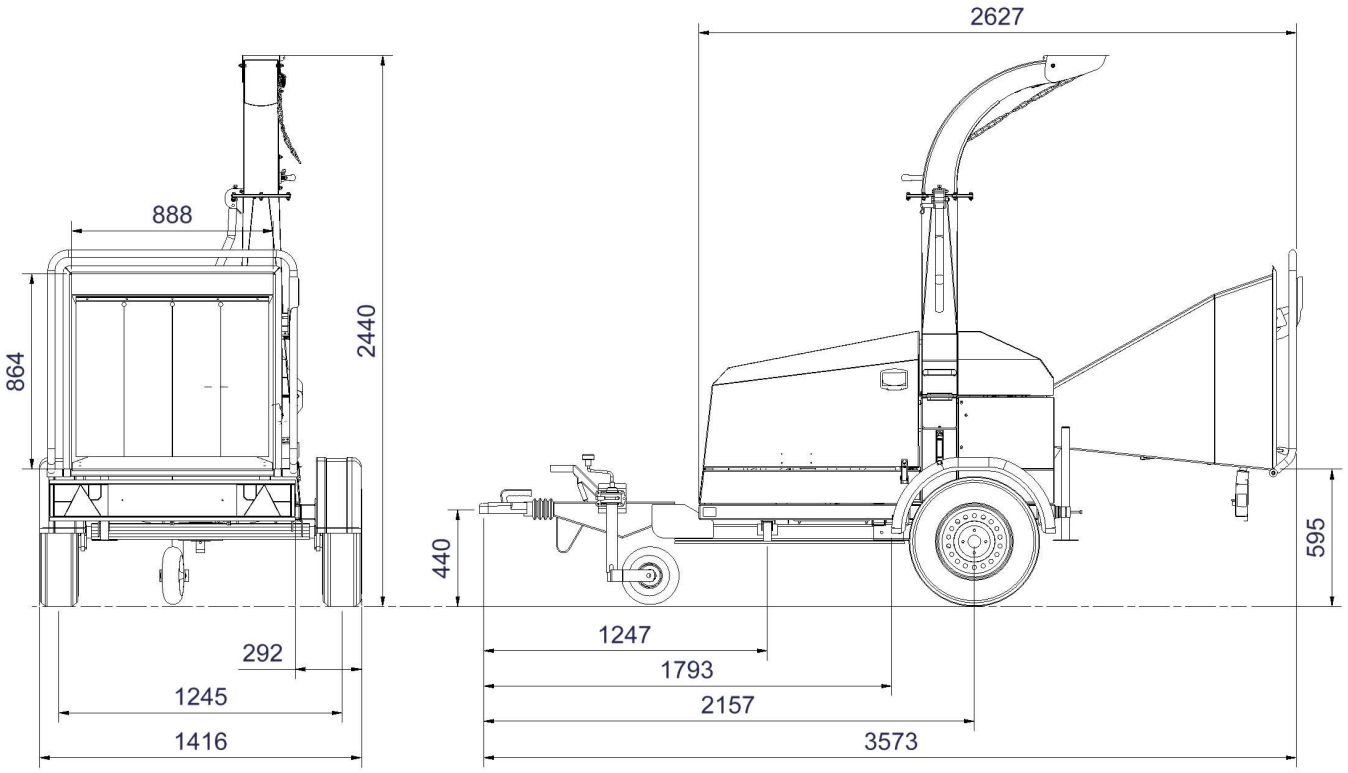


Figure 24 Dimensional sketch TP 160 MOBILE

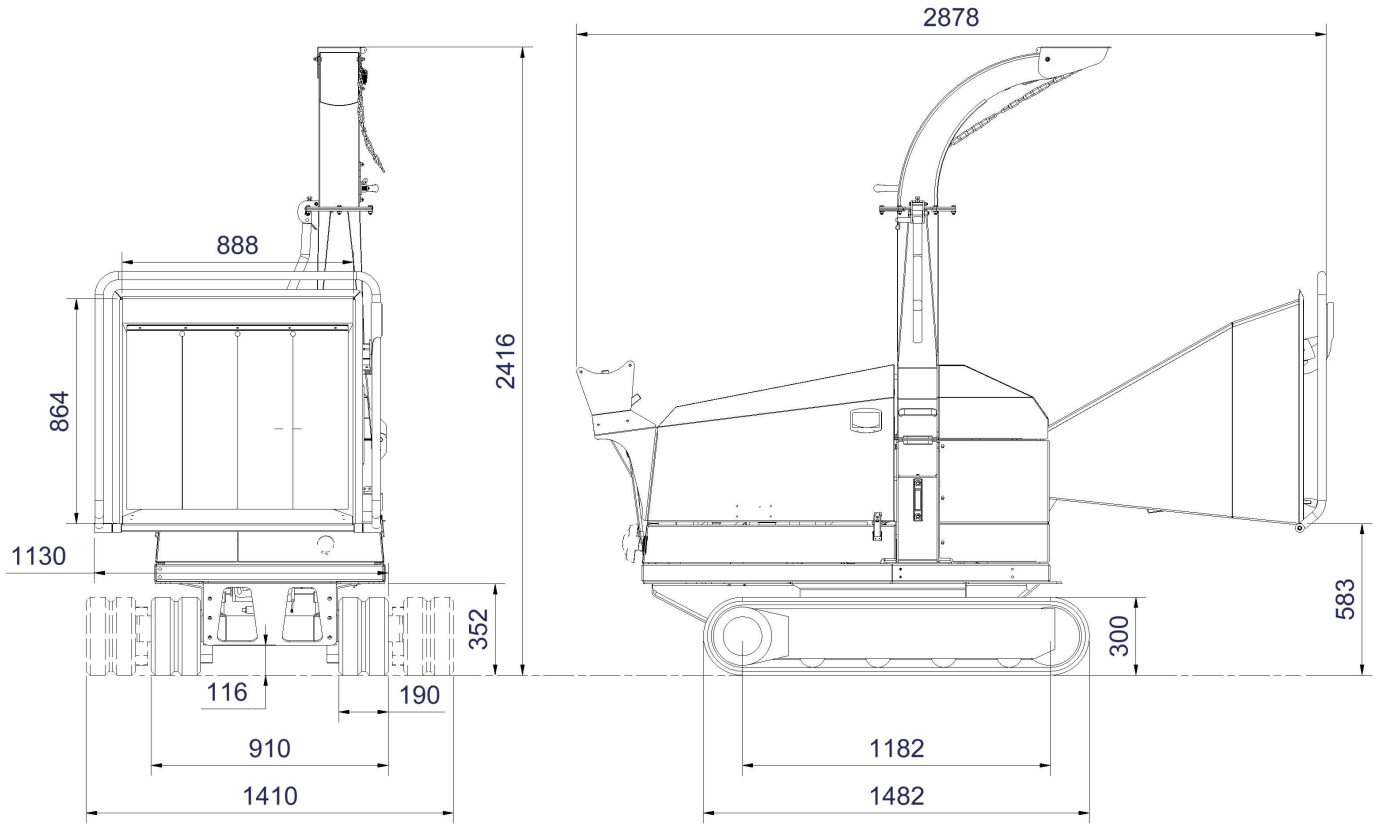


Figure 25 Dimensional sketch TP 160 TRACK

18 Accessories

- Wet grinding machine (Figure 19).
- Tool kit incl. torque wrench.
- Prolonged ejector tube horizontal.
- Extension for ejector tube vertical.
- Lock for ball and socket coupling (TP 160 MOBILE).
- Light boom (TP 160 PTO).
- Trailer coupling (TP 160 PTO)

19 Spare parts catalogue

